

German Industry and Global Enterprise

BASF: THE HISTORY OF A COMPANY

Werner Abelhauser
Wolfgang von Hippel
Jeffery Allen Johnson
Raymond G. Stokes

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The corporate history of BASF spans an era of German and international economic history that began with the rise of the “new industries” as of the late nineteenth century and continues today in their confrontation with the new economy. This book examines BASF’s corporate governance, financial system, industrial relations, system of qualification, and relation to other companies. A corporate history of BASF promises more than an insight into the functioning of an industrial organization. It also reveals the reasons for the extraordinary economic dynamics of the German empire and the enormous expansion of the world economy before World War I. BASF’s history stands at the center of Germany’s wartime economy during two world wars and highlights both its strengths and weaknesses. Just as the IG Farben trust helped support Germany’s course of politicoeconomic autarky after 1933, so it was that BASF helped facilitate West Germany’s startlingly quick return to the world market. BASF has since been among the transnational companies whose efforts at the leading edge of economic and technological progress are paradigmatic for Germany’s entry into the new economy of the twenty-first century.

Werner Abelshauser is Chair in Economic History at the Faculty of History and Director of the Institute of Global Society Studies at Bielefeld University. He has authored 13 books and edited 12 others. He has published almost 100 articles in more than 20 journals, including works in German, English, French, Italian, Russian, and Japanese.

Wolfgang von Hippel is Professor of Modern History at the University of Mannheim.

Jeffrey Allan Johnson is Professor in the Department of History at Villanova University.

Raymond G. Stokes is Professor of International Industrial History at the University of Glasgow and Director of the Europe-Japan Social Science Research Center.

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WERNER ABELSHAUSER

Bielefeld University

WOLFGANG VON HIPPEL

University of Mannheim

JEFFREY ALLAN JOHNSON

Villanova University

RAYMOND G. STOKES

University of Glasgow



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Introduction by the Editor

I. FROM NEW INDUSTRY TO THE NEW ECONOMY

The corporate history of BASF (Badische Anilin- & Soda-Fabrik, founded in 1865), spans an era of German and international economic history that began with the rise of the “new industries” as of the late nineteenth century and continues today in their confrontation with the new economy. BASF is one of the pioneers of that “second economic revolution,” whose significance in the eyes of Douglass C. North, a founding father of New Institutional Economics, far surpasses that of other economic turning points such as the Industrial Revolution. Ever since BASF was created in the midst of this revolutionary upheaval, it has had a hand in actively laying the groundwork and shaping the conditions of this stage of western economic life. The company embodies a special symbiosis between business and scientific research, one that has constituted the essence of economic value-added – and not only at BASF – from the outset but also increasingly in the economy at large.

The new industries of the late nineteenth century long ago became mainstays of the German economy. They now determine the tempo of growth, sustain the labor market, and influence what happens on the stock market. They are responsible for the leading role of exports as well. It is certainly no exaggeration to say that the future of the German economy (and many others) in the postindustrial age depends on the fate of these industries and on their competitiveness on the world market. That link makes the history of a company that is now nearly 140 years old an important chapter in a still unfinished epoch of economic history. Like most companies of new industry, BASF is among the pioneers of expanding global and transnational market relations. This expansion started in the first decades of the company’s existence. By the outbreak of World War I, the dimensions and dynamics of the world market had already developed to a level not achieved again until the second half of the twentieth century. Though the process known today as globalization was repeatedly interrupted by two world wars and the Great Depression, its intrinsic coherence remained intact. This point becomes clearer from the company’s history than from a macroeconomic perspective. BASF developed at the forefront of the process but was also drawn deep into

the accompanying twentieth-century crises that characterized the economic and political development of that period.

The corporate history of BASF therefore promises more than only a glimpse into the functioning of an industrial organization that has held its own on the market since 1865. It reveals a good deal about the reasons for the extraordinary economic dynamics of the German empire and the enormous expansion of the world economy before World War I. It permits one to probe the origins and spread of the knowledge society, in which science and research-based innovation have become the key determinants of economic growth and social development. By the same token, BASF's history stands at the center of Germany's wartime economy during two world wars and highlights both its strengths and weaknesses.

BASF's history also includes the era of IG Farbenindustrie AG, the trust formed in the complex 1925 merger of the chief German manufacturers of chemicals, pharmaceuticals, and dyestuffs. It was regarded as a pillar of National Socialist arms policy and a key factor in the Nazi party's push for autarky after 1933. For the interval from 1925 to 1945, it is not a matter of seeing the story of IG Farben as a surrogate for BASF's discontinuous corporate history. Such substitution is impossible for the very fact that BASF did not exist as an actor in those years. The Upper Rhine works group that subsumed its core factories had neither a managing board nor any other legally relevant body to exercise discretionary authority within IG Farben. Moreover, BASF was split as a business unit because the corporate structure of IG Farben drew a sharp line between Ludwigshafen and Oppau, a boundary formed by two largely independent and, in some ways, even competing divisions. Instead, the idea is to reconstruct BASF's history within the greater context of the corporate group. The way in which the corporate culture of BASF emerged and developed through institutional competition within IG Farben, especially in light of the politicoeconomic circumstances after 1933, underscores that culture's persistence, vitality, and ability to survive.

But the foremost advantage of writing the history of IG Farben from the perspective of BASF is that the group's entanglements in the Nazi regime's arms policy and pursuit of autarky – specifically in the system of forced labor in Auschwitz – can be followed and understood more discerningly than hitherto possible. Without insight into the role of IG Farben in Ludwigshafen, Oppau, and Leuna, one cannot decipher fundamental driving forces of the Third Reich's economy. Paradoxically, this assessment also applies to a quite different episode of German history, the "economic miracle" after 1945, and not only because of the dual-use structure of chemical production. Just as it was the skills of IG Farben's Upper Rhine operating group that enabled the trust to support Germany's course of politicoeconomic autarky by technical means after 1933, so it was that BASF soon stood again in the front ranks of those who facilitated West Germany's startlingly quick return to the world market. BASF has since been among the transnational companies of

German origin whose efforts to succeed at the leading edge of economic and technological progress are paradigmatic for Germany's entry into the new economy of the twenty-first century.

To penetrate to the heart of BASF's corporate history, however, one must examine the way in which the company itself functions, must delve into its corporate governance, financial system, industrial relations, system of qualification, and relation to other companies in the same sector and to the economy at large. What is the structure of BASF's social system of production and how is it changing? This question is central in each of this book's four sections, which divide the presentation of BASF's corporate history into phases of development. The answers in the "Farben period" (1865–1900) are unlike those arrived at during the major syntheses (1900–1925) that molded BASF's high technical standard and technology-centered corporate culture. The answers during the IG Farben period and its aftermath (1925–1952) clearly differ from those given by the new BASF, which emerged in 1952–3 out of what was left of its operations in the IG Farben group. Equally important is the question about the decision-making processes involved. What were the bases, methods, and results that together constitute the strategic response the company makes to the development of its markets?

From the outset, we authors were aware of how difficult it would be to address issues pertaining to specific epochs and still keep the whole picture of BASF's corporate history in focus. We therefore agreed that the unifying element of our presentation would be the social system of production, of which corporate culture can be considered the overall expression. The rules and norms that shape how people think and behave in an organization – those strengths and weaknesses acutely affecting a company's success – are not created by some abstract biological process of organizational aging but rather mostly by incentives and rewards provided by the market. They also determine the latitude for pursuing entrepreneurial strategies and limit the discretionary freedom of top management. The separate eras in the history of BASF have each helped bring about and shape the organization's corporate culture in a specific way, yet that culture's abiding continuity allows the company to transcend such temporal boundaries.

BASF's interest in having independent historians analyze its corporate history ideally matched our desire to use BASF's history in order to answer pressing questions posed within the rapidly expanding field of corporate history. They go far beyond the interest in the Nazi period that the public has shown for some years now. The emergence of New Institutional Economics as one of the most dynamic schools in the discipline of economics has brought entrepreneurs and managers to acknowledge the significance of institutions as cornerstones of corporate culture and as foundations for their own scope of action. This perception is sharpening top management's cognizance of corporate history quite apart from anniversaries and memorials. History matters!

BASF not only funded the study of its corporate history, it also assisted in any other way it could. The work is therefore based on a broad range of sources. Of course, BASF's own archive was the primary source consulted. The organization granted our request for unrestricted access to all the material. It even released files that had not yet been catalogued, mainly the minutes of managing board meetings of BASF AG from 1953 to 1975, which furnish a complete record of the decision-making process behind the organization's corporate policies. For subsequent years, BASF applied the rules governing public archives, under which their documents remain closed for thirty years, even for research purposes. The company facilitated our work by providing the project with a competent and committed team of historians and archivists directed by Dr. Lothar Meinzer. We sincerely thank him and his colleagues in the archive: Dr. Susan Becker, Jutta Kissener, Dr. Christiane Pfanz-Sponagel, Dr. Kristina Winzen, and Annette Wolpert. However, we authors alone are responsible for the results of the work. We state unmistakably that BASF is the subject of this study and was not itself involved in the scholarly investigation of its history. On the contrary, the company gave – and strictly honored – its express pledge not to influence the work of the authors and the editor. The present study is anything but self-aggrandizement on the part of BASF. To suspect otherwise would be a gross misunderstanding.

The authors and the editor are also indebted to those outside BASF who were involved in bringing about this work. We are grateful to Anne Stokes (Glasgow) and David Antal (Berlin) for providing the English translations of the contributions by Wolfgang von Hippel and Werner Abelshauser, respectively. I have enjoyed working with the staff at Cambridge University Press in New York, Dona Hightower Perkins read the manuscript, Michie Shaw managed the production, and Frank Smith gave the project his full support. At home, Matthias Band, Lars Heidemann, Christel Schwigon, and Frank Werner fought the battle of indexing while managing the files making for the corrections to various drafts of the manuscript. We express our sincere appreciation to all of them.

Bielefeld, May 2003

Werner Abelshauser

Becoming a Global Corporation – BASF from 1865 to 1900

Wolfgang von Hippel

At the beginning of the twentieth century, the Badische Anilin & Soda-Fabrik (BASF) was “without question the largest chemical factory in the world,”¹ at least in the field of organic chemical production. The firm’s history – and especially its early history – mirrors to an unusual degree the development of an entire industrial sector, the coal-tar dye industry.

The coal-tar dye industry came into its own as the most important “new” industrial sector in Germany during the second half of the nineteenth century, prior to, but also alongside the electrical industry. Through the increasingly scientific basis of its production, it proved an important force for economic modernization in imperial Germany. Furthermore, within the space of just a few decades, the industry was able to secure a virtual international monopoly owing to its capabilities in production and sales of synthetic dyestuffs. In fact, on the eve of World War I, it manufactured more than 80 percent of world production and accounted for 90 percent of world trade in the field. What is more, the industry had also expanded into new areas of production. The largest firms had already incorporated into their planning and production programs promising new areas such as pharmaceuticals, photographic supplies, and the synthesis of rubber and ammonia.

When the German coal-tar dye industry first started out, its rapid rise to a commanding position in the world economy could not have been predicted. After all, the starting conditions in England were certainly far better, in terms of supply of raw materials and availability of capital, but also in terms of application of industrially proven technical processes (e.g., the soda industry). Markets, on the other hand, were favorable everywhere and helped bring about the industrial expansion of synthetic dyestuffs production. In the international marketplace of textile production, in particular, the new dyes faced competition only from natural dyestuffs, which were generally more expensive. They soon demonstrated their superiority over these traditional products in their range of colors, the ease with which they could be used in the production process, and, to an ever-increasing degree, in colorfastness, too.

¹ *Weltausstellung*, 68.

6 *Becoming a Global Corporation – BASF from 1865 to 1900*

So it was that, by the twentieth century, the coal-tar dye industry developed in a close symbiosis with one of the leading branches in early industrialization, the textile industry. The prospect of high profits provided sufficient incentive for a substantial number of producers in England, France, Germany, and Switzerland to move into the new area.² However, the market, which was contested with increasing bitterness, allowed firms to operate successfully in the long term only if they:

- 1) had chosen a production site that was advantageous both from a technical and a commercial point of view;
- 2) were able either to translate rapid progress in scientific and technological knowledge into industrial innovations within the shortest possible time, or else had secured an effective position of scientific and production leadership through a systematic research program;
- 3) possessed the wherewithal to build up a healthy market for their products, thus establishing the most important precondition for profitable large-scale production.

The second and third of these points, which are closely linked with the effectiveness of systems of education, training, and science and with economic and social attitudes, eventually proved especially important for the astonishing success of the German coal-tar dye industry as a whole, and for BASF in particular.

In the first decades of its existence, BASF concentrated on the manufacture of synthetic dyestuffs and products associated with them. The company was able to achieve a leading market position internationally in this area and thus laid a solid basis for further expansion. Around 1900, a number of developments took place both within and outside of the firm, which signaled that even greater changes would take place, changes that would require substantial investment and a corresponding increase in share capital. In the firm's major area of interest, dyestuffs, key breakthroughs came in the form of full-scale industrial production of synthetic indigo (1897) and the discovery of the indanthrene dyes (1901). In the field of inorganic production, the process for liquefying chlorine (1888), the contact process for sulfuric acid (1890/98), and the electrolytic manufacture of chlorine all set the stage for new technological directions that led eventually to synthesis of ammonia and, with that, a fundamental change in the product spectrum of the company. In the area of sales, the first "small" community of interest

² The most important overviews of the history of the chemical industry in Europe and North America are in the works of L.F. Haber and, from the standpoint of technical development in particular, Hohenberg, *Chemicals*. For the dyestuffs industry (with particular emphasis on its scientific development), see more recently Travis, *Rainbow Makers*, and also the contributions in Homburg, Travis, and Schröter, *Chemical Industry*. For Germany in particular, see Beer, *Emergence*, and Wetzel, *Naturwissenschaften*.

(“*Dreibund*”) between BASF, Bayer, and Agfa (1905–16), an initiative established in competition with the similar agreement between Hoechst, Cassella, and Kalle (“*Dreiverband*”), had as its goal a restructuring of the market and of market strategies and had, therefore, a pronounced impact on internal firm organization.

However, if there was a stronger pattern of change around 1900 than was previously the case, this does not mean that the first 35 years of the history of the BASF firm were a period of idyllic calm. Contemporary actors, who anticipated an uncertain future, experienced the beginnings of the coal-tar dyestuffs industry much more often as a new departure. Despite all of the tensions, vicissitudes, and occasional complaints, it was also a departure that was experienced and generally acted out with optimism and positive expectations, and, in retrospect, appears largely as a success story.

1. THE PREHISTORY

Friedrich Engelhorn – Pioneering Entrepreneurship

Even though corporate structures and the anonymous forces of the market seem to play a huge role in the development of modern big business, what we now term “human capital” (something frequently valued as the decisive resource of the economy) remains extremely important. This human capital includes, in particular, the senior management of firms, mostly owing to the extensive responsibilities they carry. During early and high industrialization, when the economy and society underwent especially dramatic change, the personal element was at its most important. The pioneer role of the “dynamic entrepreneur” (J.A. Schumpeter) in Germany’s move into the period of high industrialization is exemplified especially well in the life and works of Friedrich Engelhorn (1821–1902), the founder of BASF.

Besides the problems of raising capital, the expansion of coal-tar dyestuffs production posed unusual technical and commercial challenges. The purchase of raw materials that had previously been scarcely in demand had to be organized, efficient production methods and the necessary technical apparatus had to be developed, and the new products had to be sold to a customer base that was frequently traditional in its orientation. Thus we find among the successful founders of coal-tar dye factories not only dye merchants and master dyers but also pharmacists and trained chemists. Additionally, however, there were also men who were active in a number of different business fields, men who have been characterized as all-round entrepreneurs.³

Friedrich Engelhorn belongs to this last group.⁴ He was born in Mannheim on July 17, 1821, the third son and fourth child of the brewery master

³ Kocka, *Unternehmer*, 45f.

⁴ Engelhorn’s biography is dealt with extensively in Schröter, Engelhorn.

and later wine merchant, Johann Engelhorn, and his wife, the daughter of a nearby innkeeper. In social terms, therefore, he was a child of the urban middle class.

When his parents sent the nine-year-old boy to a well-respected grammar school in Mannheim, it seems likely that their motivation in his case, as in that of his elder brothers, was not only to provide an opportunity for an excellent education, but also to provide opportunities for the boys to enter new professional territory outside the family tradition. (One of his brothers became a publisher, the other an attorney.) Nevertheless, Friedrich's school career ended early. In 1834, before the end of his third year, he left the grammar school to take up an apprenticeship with an established Mannheim gold and silversmith. In 1837, the sixteen-year-old apprentice went on a nine-year journey that took him to a number of different places, including Frankfurt, Munich, and Vienna, and later to Switzerland. He ended up in France, where he visited Lyon, known as the metropolis of silk processing, and, in particular, Paris, the European center for practically all luxury goods.

In 1846, he returned to Mannheim, where in March 1847 the young "gold worker," "bijou maker," or "jeweler" (as he called himself) obtained citizenship and guild rights in the city. He opened a workshop and, a few months later, married the daughter of a Mannheim brewer, Marie Brüstling. This was in every sense a "good match," particularly because her dowry secured the basis for his professional independence.

Thanks to his many years spent abroad in much larger cities of central and western Europe, Engelhorn had seen with his own eyes many of the major developmental trends of his age. Now at home in an environment in which the beginnings of intensive industrialization could be detected, he set his sights beyond his craft from the beginning. During the revolutionary year of 1848, together with a Belgian engineer and another member of the Mannheim middle class, he founded a limited liability company known as "Engelhorn & Cie.," in order to produce and sell "portable gas" (i.e., bottled gas). Engelhorn was the largest financial contributor to the company, and he began trading by the end of the year, this in spite of the fact that the Belgian partner proved unreliable and the Mannheim partner died unexpectedly.

In entering into his first large-scale business enterprise, the one-time goldsmith demonstrated characteristics that would help ensure his remarkable success in the coming decades. In addition to decisiveness and stamina, he also showed a willingness to take calculated risks on the basis of clear insight into the long-term possibilities of a given project. In 1848, on the basis of existing experience, it was beyond question that the industrial manufacture of gas for lighting was a safe venture. The same was true at the beginning of the 1860s for the newly discovered aniline dyes. After all, gas lighting was already widespread in the 1840s, especially in England and the United States, and Engelhorn had come into contact with this personally during his itinerant years, in Vienna and Paris at least. In the Upper Rhine area, artificial

lighting had been introduced in the spa town of Baden-Baden in 1845, and – after some teething problems – in 1846 in the capital of the Grand Duchy of Baden, Karlsruhe. In 1849 the leaseholders in the latter sought to include Mannheim in their lucrative business. The potential competitive situation between these newcomers and Engelhorn was resolved at the beginning of 1851, when together with him they formed the Badische Gas Lighting Company (*Badische Gesellschaft für Gasbeleuchtung*) that took over a long-term and profitable lease of the Mannheim gas works (which the city had commissioned them to build). Engelhorn, who brought his bottled-gas works and its customers into the firm, served as its local commercial and technical director for the following decade and a half. In 1865, however, he sold his share of the company to business partner Friedrich August Sonntag, turning his full concentration to the new dyestuffs business.

After all, as early as 1859/60, gas works director Engelhorn – by now a wealthy, respected, and politically active member of his parent city's middle class and on the best possible terms with the local financial and economic elite – was clearly on the lookout for favorable investment opportunities. An indicator of this was his, admittedly quite short, financial engagement in a machine factory and the founding of a commission and freight company (Engelhorn & Co.) in New York on September 15, 1860. The managing director of the latter was Friedrich's younger brother Louis, who, through unlucky speculation, soon drove the firm into bankruptcy. Engelhorn, however, remained much closer to home in his own business dealings, especially when in 1860 he decided to build an aniline and dyestuffs factory next to the Mannheim gas works.

A Massive Market – The Beautiful World of the New Dyestuffs

The discovery of the first aniline dyes, which drew notice from far and wide, and the unusually high profits that their production promised thanks to lively demand from the outset naturally did not remain hidden from Engelhorn. Only relatively few effective dyestuffs were available on the domestic market, and all of them were from “dye plants,” plants “whose roots, wood, bark, stems, leaves, flowers, or fruits contain dyes which are subject to technical application, or else can deliver this after suitable processing.”⁵ One of the most important of them was Turkish red, which came from the madder root native to the Levant and which, beginning in the sixteenth century, was cultivated in western and central Europe. Another was the blue and black dye that was extracted from woad and that through the addition of other dyes could give brown or green tones.⁶ Also important for yellow shades were

⁵ Meyers Konservations-Lexikon, vol. 6 (1894), 188.

⁶ For this and the following, see Lauterbach, Geschichte; Georgievics, Handbuch, 466ff; Reckel, Aufstieg und Fall.

buckthorn (Persian berries), dyer's luteolin, or reseda, dyer's broom, and dyer's safflower. Orseille, a red dyestuff, was raised in only mediocre quality from lichens in central Europe. But better quality and larger quantities were available only from Madagascar, Zanzibar, South America, and the Canaries. In any case, the discovery of America and of the sea route to India and the Far East decisively enriched the range of available dyestuffs. These new geographic discoveries brought with them access to a large number of previously unknown plants and trees such as turmeric (Indian saffron), fustic wood, redwood, logwood or campeachy wood, sandalwood, and quercitron or flavin (the bark of the North American dye oak). At times, the new goods managed to drive out previous products, as for instance in the case of indigo. Cultivated primarily in India, indigo, with its strong dye content, effectively destroyed the competitiveness of domestic woad, or wild indigo, cultivation, which had its main focus in Thuringia.

Many of these vegetable dyes, however, turned out to be not especially light or colorfast. Intensive methods (such as extraction and fermenting) therefore had to be employed to get superior, more concentrated and pure materials from the natural starting materials. These included plants, woods and even insects (such as the cochineal scale insect, which came from Central and South America for the most part and which provided the expensive red carmine). The madder root, for example, contained only about .5 to 1.5 percent dyestuff, which in a natural state was mixed with a large number of brown-colored contaminants. What is more, the techniques that had to be used to manufacture and apply dyes were complicated and time-consuming. The Turkish red dyeing process using madder, for instance, required up to twenty separate operations, which took about six weeks to complete. In addition, there was no standardization of colors, and impurities led to unwanted shades. The reliability of the dyeing process thus remained limited, even in the case of dye masters with lengthy experience. On top of this came the problem that various materials – in particular textiles such as wool, cotton, silk, and mixed fabrics, but also leather and paper – had to be treated initially through the so-called mordant process (especially using metal oxides) so that the dye would take. The dye process, just as the dye-printing process for cotton, thus remained a craft that required a good deal of experience and tacit knowledge. It also produced a pronounced tendency toward extreme secrecy with regard to individual dye recipes.

Given these difficulties, the synthesis of an artificial dyestuff in the chemical laboratory by the 18-year-old Englishman William Henry Perkin in 1856 created a sensation. For the first time, there arose the attractive possibility of producing dyestuffs independently of certain plant-based raw materials, in almost any quantity desired and of a standardized quality. Moreover, it could all be achieved without the risks associated with cultivation and uneven harvests, or longhaul transport.

Perkin's accidental discovery was, however, not entirely an accident. Instead, it was the product of a scientific branch that had been developing rapidly over several decades, that of organic chemistry or the chemistry of carbon compounds. German, as well as French and British, chemists contributed substantially to the success of the new field. A center of modern chemical research in the German area was of indirect significance for the discovery of this beautiful new world of dyestuffs, and for the transformation of the chemical craftsman, with his generally undirected experimentation, into an academic pursuing systematic and analytical investigations. It was founded by Justus (von) Liebig, who in 1824 at the age of 21 was named to a professorship in chemistry at the University of Giessen. His legendary chemical laboratory for experimental instruction in the context of university study was the training ground in the new field for a whole generation of chemists, including August Wilhelm (von) Hofmann (1818–92). Between 1845 and 1865, Hofmann served as professor at the Royal College of Chemistry in London, which had been established using Giessen as a prototype. It was in this capacity that he became the father of the British dyestuffs industry.⁷

Through his investigations into aniline as a derivative of benzene, Hofmann himself laid the scientific basis for dyestuff chemistry, and his own discoveries contributed to the emerging era of vast variation in dye colors. In 1856, his young student and assistant William Henry Perkin (1838–1907), stumbled upon the coal-tar dye “Tyrian Purple,” or “mauve” (named after the hollyhock bloom) in the course of an attempt to synthesize quinine. Shortly afterwards, in a small factory and with the financial support of his family, Perkin paved the way to industrial production of this unusually pure dye, which was difficult at first but which yielded very high profits.⁸

The mauve mania that followed in France and England in the next few years brought with it patent-infringing imitation in France. But it also stimulated the search both for alternative processes and for other artificial dyes. Thus, in 1859 in Lyon, François Emmanuel Verguin succeeded in producing aniline red, also known as fuchsin, or magenta. Just as was the case with Perkin's discovery, commercial exploitation soon followed. Fuchsin, however, was only the first in a long series of success stories in the coming years, virtually all of which came from Britain and France.

In 1862, at the London World Fair, British and French firms displayed their products “of this remarkable chemical revolution” (A.W. von Hofmann) to an astonished public. What followed can only be described as a sort of gold rush in the dyes market, which was accompanied by pell-mell inventive activity. Those who secured know-how or licenses early enough were assured

⁷ On Hofmann, see especially Meinel and Scholz (eds.), Allianz.

⁸ Travis, *Rainbow Makers*, 31 ff.

substantial profits. After all, the new dyestuffs were at first almost literally worth their weight in gold.

One of the First Coal-Tar Dye Factories in Germany

For Engelhorn, these developments opened up previously unimaginable perspectives. It was only a short leap of imagination to come up with the idea of using coal tar – which to that point had been a by-product of gas production both burdensome and difficult to dispose of – in a profitable way in his own manufacturing plant. Engelhorn raised the capital for a dyestuffs factory together with two of his previous business partners, Friedrich August Sonntag and the “merchant” Otto Dyckerhoff, the latter Engelhorn’s compatriot in the unsuccessful New York commission business. The choice of an expert technical director was without doubt essential for the success of the new company. In making it, Engelhorn benefited from his contacts in the Mannheim business community and from the fact that a number of significant chemical firms had already been established in the Mannheim area. Liebig’s former student and assistant, Carl Clemm-Lennig, the co-proprietor and director of the Mannheim Düngerfabrik (fertilizer factory), was instrumental in establishing a connection with his nephew, Carl Clemm (1836–99). After a technical education in Karlsruhe, study of chemistry in Giessen, and his first practical work in his uncle’s factory, Clemm had pursued research and developed new knowledge in the area of aniline dyes, which were worth their weight in gold. Now, with the capital put up by his business partners, he was able to begin a career as an entrepreneur.⁹

It is true that Otto Dyckerhoff, the commercial director, and Carl Clemm, the technical director, gave their names to the new company “Chemische Fabrick Dyckerhoff, Clemm & Comp.,” which was founded on June 8, 1861, but with contractually retroactive effect from October 1, 1860.¹⁰ Engelhorn, however, played a decisive role in the planning and implementation of the project, including the stated aim of the company’s founding document. For the next 15 years, production at the company was “supposed to consist initially of the preparation of aniline and coal-tar dyes, but later to extend to other technical products” (Paragraph 1 of the founding document). In this way, following hot on the heels of the firm of Rudolph Knosp in Stuttgart, one of the first coal-tar dye factories in the German area came into existence in Mannheim. The nucleus of the later BASF, it was founded at about the same time as the Weiler aniline factory in Cologne-Ehrenfeld (1861), two years prior to Kalle & Co. in Biebrich on the Rhine (1863), and six years before

⁹ Contract from April 15, 1865, BASF UA, C 627/1. A collection of material relating to Carl Clemm is in BASF, WR.

¹⁰ Documents in BASF UA, A 0/1/7 and A 0/2/1; Urkunden vol. 1, 8.

the Gesellschaft für Anilinfabrikation (later the AG für Anilinfabrikation, or Agfa) near Berlin in 1867. In similar fashion to Knosp in Stuttgart, other firms took up coal-tar dye production at first only in addition to their previously existing commercial ventures. These included, for example, Karl G.R. Oehler in Offenbach on the Main, which did so in 1860, and it was followed three years later by Meister, Lucius & Brüning in Höchst and Friedrich Bayer & Co. in Elberfeld. The latter two became BASF's main competitors in the coming decades. To name just one other prominent example, the precursor of Geigy was founded in Switzerland in 1860.

From the very beginning, Engelhorn appears to have envisaged a large-scale operation. In any case, even in the founding phase, he followed a plan for creating a comprehensive production program (see Paragraph 1 of the founding contract). Through vertical integration and simultaneous diversification of the product palette, the idea was to operate as flexibly and inexpensively as possible in a market that was difficult to gain an overview of and ever changing, but that, in the long term, was expanding strongly.¹¹

There was little difficulty in gaining the required concession for a chemical plant, which took only a few weeks.¹² Already on November 13, 1860, it was granted "to the gentleman manufacturer Engelhorn" from the Grand Duchy's city office in Mannheim "under the condition that in the course of production the neighborhood would not be burdened or disadvantaged by noxious odors or through poisonous effluents, for which case further authorization would be necessary." Such problems apparently did not arise. On July 21, 1860, Engelhorn and his partners had acquired a preparation plant for zinc ore, the "zinc foundry" (Friedrichshütte) on the Jungbusch, for 45,000 guilders. The foundry operated on a relatively modest scale for the time (about 30 workers), and it employed the simplest methods of production. Still the plant installed there developed with relatively few teething difficulties. Although its development was not quite as rapid as Engelhorn and his colleagues had perhaps hoped,¹³ its weekly production of 10 hundred-weight of aniline oil (which was further processed into red and violet dyes¹⁴) resulted in considerable profits. This is clear from the few known statistics: The company's capital was supposed to be 100,000 guilders (25,000 per partner); against that, the pure profit in the 1862/63 business year (after deduction of interest and depreciation) stood at 266,000 guilders.¹⁵ Furthermore,

¹¹ On the significance of integration and diversification and their interactions with economic expansion and change in firm structure, see Kocka, *Expansion*.

¹² The following is based on materials in BASF UA, A 0/1; Urkunden, vol. 1, 5.

¹³ See materials on the quarrels with the firm Heinrich Dietze & Co. in BASF UA, A 0/2/6 and A 0/2/7.

¹⁴ This in September 1862, according to Caro, *Reden*, 220.

¹⁵ Contract with the Verein Chemischer Fabriken of May 7, 1864, BASF UA, A 15 (previously A 19/1/8).

when it was transferred to the newly founded BASF in mid-1865, the material value of the firm was set at more than 529,000 guilders,¹⁶ with additional consideration in terms of business value (the business, its customers, and its business secrets) comprising an additional 147,000 guilders.¹⁷

Early in the brief existence of the factory, the number of dyes manufactured there rose – fuchsin (magenta, or aniline red) was joined by Hofmann's violet and aniline blue. What is more, total usage of aniline increased within one-and-one-half years from 500 to 4,500 kilograms per week. Plans were made for still greater volume. As a consequence, Engelhorn arranged for August Clemm (1837–1910), the younger brother of Carl, to be taken on at the beginning of 1862. Like Carl, August had been trained in Giessen, where he took his doctorate, and he was apparently the better chemist. August Clemm moved from the Karlsruhe Polytechnic to Mannheim to become the firm's second technical expert¹⁸ and a partner in what was now known by January 2, 1863 as "Sonntag, Engelhorn & Clemm."¹⁹ Dyckerhoff, in the meantime, pulled out of the firm at his own wish at the end of 1862 in order to turn his attention to the cement business.

In keeping with both the founding spirit of the young chemical industry and his own nature, the successful entrepreneur set a course for expansion. Despite impressive profits, Engelhorn recognized very early on the necessity of tackling costs in the interest of long-term competitiveness. The question was whether it was cheaper for the company to manufacture the inorganic materials (such as arsenic, hydrochloric, nitric, and sulfuric acids, as well as soda) it required rather than purchasing them from the Verein Chemischer Fabriken in Mannheim, as it had done previously. After all, faced with a de facto monopoly the aniline factory was in danger of becoming dependent on the Verein.²⁰ The latter, founded in 1854 and with factories in Mannheim, Worms, and Heilbronn, had seen off all competitors for its products in the region, and therefore did a land office business. In economic terms, close cooperation was in the interest of both sides, since their production areas complemented each other and promised cost-minimizing (and/or profit-maximizing) synergy effects. As the considerably smaller company, which was dependent on the Verein for its supplies, the aniline factory was in the weaker negotiating position. But the prospect of the Verein's best customer, if push came to shove, starting its own production in competition to the Verein added considerable weight to that initial position. The directors and the administrative council of the Verein consequently

¹⁶ This consisted of a selling fee of 453,000 guilders and an additional payment of 76,236 guilders (see note 28).

¹⁷ BASF UA, A 0/2/5.

¹⁸ Appointment contract of February 10, 1862; Urkunden, vol. 1, 9, BASF UA, A 0/1/7.

¹⁹ Urkunden, vol. 1, 10–11.

²⁰ On the following, see in addition to Hintz, *Werden und Wirken*, also Schröter, Engelhorn, 104ff.

agreed to enter into a fusion agreement, which was to take effect, if possible, from July 1, 1864.²¹ But the general assembly of the Verein, which had at first also ratified this course of action, eventually reconsidered owing to the influence of altered opinions at the executive level of the Verein. It thus turned down the contract. In view of rapidly growing competition within the dyes market, the long term prospects of Engelhorn's company were by now viewed much more skeptically than had previously been the case.

Unable to attain his goal of product self-sufficiency in the easiest possible way of a fusion with a suitable partner, Engelhorn had only one path open to him – the undoubtedly more risky one of producing the required materials in-house and thus entering into hard-fought competition with the Verein Chemischer Fabriken. Because of the very scale of this project, and in contrast to previous ventures, he and his partners had to turn to the capital market. They had reasons to expect success, however standing within the circle of the economic middle class in Mannheim – particularly through the close friendship with Seligmann Ladenburg (1797–1873),²² who was experienced in industry and railway financing and the leader of the renowned Mannheim bank W.H. Ladenburg & Sons (after 1905 the Süddeutsche Disconto-Gesellschaft AG). Engelhorn and his partners also exuded confidence in the prospects for success in the dyestuffs industry. Within the short time, these advantages helped them secure the basis for a joint-stock corporation. The company's initial capital of 1.4 million guilders corresponded approximately to the estimated capitalization of the Verein Chemischer Fabriken. The first German coal-tar dye factory that simultaneously produced the inorganic materials required for its organic manufacturing processes could now be christened.

2. THE EARLY YEARS (1865–1873)

Mannheim or Ludwigshafen? The Dramatic Establishment of the Corporation

On March 25, 1865, in the house of Seligmann Ladenburg, a small, hand-picked circle of men, all with considerable capital behind them, met to come to some sort of agreement on the means through which the new joint-stock corporation was to be established.²³ Several newcomers joined the existing partners in the aniline factory, including six members of the Ladenburg family. These included Seligmann and his sons Carl (1827–1909) and Ferdinand (1835–99) as well as his nephew and son-in-law Moritz Ladenburg (1818–71). The latter three were all involved in the Mannheim Bank. Additionally, Seligmann's son-in-law Dr. Ferdinand Beit (1817–70), a

²¹ BASF UA, A 15 (previously A 19/1/8).

²² See Pieper, Ladenburg, or more extensively Jacob, Ladenburg. On the family, see Waldeck, *Mannheimer Familien*, 67 ff.

²³ The contract is in Urkunden, vol. 1, 12, BASF UA, A 11/1/5.

Hamburg banker, and his youngest brother, Dr. Leopold Ladenburg (1809–89), a barrister in the high court and an important personality in Mannheim public life, were both present. The Seligmann family members were joined at the meeting by Friedrich Reiß (1802–81), a salesman who had served as lord mayor of Mannheim from 1849–52, had been active for many years in the city council, had been a friend of Engelhorn since the years of revolution in 1848/49, who had subsequently co-founded the Rhine Credit Bank in 1870. Also present was the “Particulier” Carl August Fries (1808–84). Fries was already experienced in the sector as one-time partner in a madder factory in Heidelberg and then as the co-founder of a chemical factory in Wohlgelegen and as a shareholder in the Verein Chemischer Fabriken. Finally, the grand ducal district court councillor Moritz Ellstätter was present also. He had served for several years as a syndic in the Berlin-based Diskontobank and later became president of the finance ministry in Baden.²⁴

In a smart move, Engelhorn also brought another partner, Julius Giese, into the corporation. Beginning in 1854, Giese had served as a deputy technical director of the Verein Chemischer Fabriken and thus possessed professional knowledge about the manufacture of inorganic products, which would soon be urgently needed. The heavy conventional penalty of 10,000 guilders, which was imposed when he moved to another company with similar product lines to the one he had just left, was paid on his behalf by the new firm, which also committed itself to giving him a respectable stock package (35 shares). Of the total of 1,400 stock shares with a nominal value of 1,000 apiece, 600 went to the owners of the previous firm of Sonntag, Engelhorn & Clemm, amounting to six times the value of the founding capital of 1861. Of that, 435,000 guilders went for property (buildings, grounds, and equipment) and 147,000 guilders for the business, for its customers, and for production secrets. A further 380 stock shares were subscribed to by the small circle of those present, led by Engelhorn himself (110) and the Ladenburg banking house and Friedrich Reiß (100 each). The remaining 385 shares were to be placed by the Ladenburg banking house among suitable interested parties. For the next ten years, Engelhorn committed himself “to take over the top leadership of the firm as the first director without a fixed salary, and neither directly nor indirectly to participate in any way with a competing business.” The Clemm brothers and Giese became the technical directors, but, unlike Engelhorn, could only sign contracts on behalf of the firm “with a collective signature of any two of these gentlemen.”²⁵

The sales contract between the old and the new firm and the founding contract of the new joint stock company were notarized in Mannheim on April 6, 1865,²⁶ a date that is also considered the founding date of the Badische Anilin- & Soda-Fabrik (BASF) even if the company did not come

²⁴ See Ellstätter, Moritz Ellstätter. ²⁵ Rundschreiben, July 1, 1865, BASF UA, A 11/2.

²⁶ BASF UA, A 11/1/6, A 11/1/9, A 12/1/6, A 12/1/7; GLA 276/1302; Urkunden vol. 1, 14.

into formal effect until April 15.²⁷ The ending and starting balance sheets of June 30/July 1, 1865 were so advantageous to the previous owners of the firm that, in addition to the stock shares with a nominal value of 600,000 guilders, they were able to insist on an additional payment of 76,263 guilders.²⁸

It is, of course, true that the new company was faced with some initial turbulence when its founders started their search for a suitable site for the planned new large-scale factory.²⁹ Naturally, Engelhorn wanted to locate the new establishment in Mannheim, and the preconditions for this seemed favorable: Already on April 5, 1865, the banking house of W.H. Ladenburg & Sons was able to sign a preliminary contract to purchase a well-suited piece of real estate within the city on behalf of the “company that was in the process of being formed.”³⁰ The prospective site included over 14 hectares of land directly on the Neckar River with immediate access to the “port ring railway,” that connected the Mannheim port with the train station. This guaranteed supplies of the large quantities of water necessary for the production process and ensured the shortest possible connection to the most modern transport.

But if the deal, which had been worked out in such a hopeful fashion, was eventually to fall through, it was owing to differing expectations within the city’s self-administration bodies. The agreed price of 2,500 guilders per hectare for the property was seen as a moderately cheap sales price, although in view of the expected indirect economic advantages for the city it was also perceived as fair enough. For this reason the local council and the small citizens’ committee gave their blessing to it. When, however, the large citizens’ committee – the final arbiter within the city in property matters – turned down the proposed deal on April 12, 1865 with a clear majority, it was above all because of hopes for a higher yield for the city’s coffers.³¹ The basis for these hopes was, in turn, a purchase offer brought into play at the last minute by the Verein Chemischer Fabriken – an offer, it soon became evident, that was not serious, but was instead meant to get rid of threatened competition. Despite this, however, the city of Mannheim persisted in its interest in getting a firm to locate on the controversial site. This was something the BASF leadership used skillfully over the coming days and weeks in order to strengthen their own negotiating position in moving forward as quickly as possible with plans for locating across the Rhine in the Bavarian Palatinate.

The prompt reaction of the leadership in the aftermath of the vote in the large citizens’ committee makes it clear that they had already decided to try the other side of the Rhine in the event of an (even temporary) rejection by Mannheim’s government. On the very same day of the vote, Engelhorn

²⁷ Copy in BASF UA, A 11/2/1 and A 12/1/6; Urkunden, vol. 2, 76.

²⁸ Urkunden, vol. 1, 23 and 26; BASF UA, A 11/2/1.

²⁹ Documents related to the following are in BASF UA, A 11/2/4. A recent depiction is in Schröter, Engelhorn.

³⁰ BASF UA, A 11/2/5. ³¹ See the press reports in BASF UA, C 8212.

together with Seligmann and Carl Ladenburg traveled across the river to Ludwigshafen in order to examine a suitable parcel of land in the Hemshöfe area north of the city for possible purchase.³² Two days later, the (provisional) administrative council of BASF authorized Engelhorn to carry out the corresponding negotiations. On April 19, he signed a contract to make the first purchase of a parcel of land, subject to official permission for building plans. To be sure, news of this stimulated considerable positive attention in Ludwigshafen, especially owing to the potential positive impact on the city's economy and inhabitants. After all, the location of BASF on the left bank of the Rhine offered Ludwigshafen the chance to catch up to some degree in its competition with Mannheim and also the possibility of being able to draw additional firms to locate there. The city council therefore pursued the project with the district government in Speyer, and, despite some initial reservations, authorities quickly signaled their readiness to reach an agreement.

So it was that, on April 24, Engelhorn was able to submit his "initial application for a concession for a chemical factory"³³ near Ludwigshafen to the Speyer district office without any fear of rejection. The application indicated that the factory would produce "sulfuric and nitric acids, sulfate, raw and refined soda, and calcium chloride" for sale in the Palatinate, in Hesse, and in Rhenish Prussia. Its reference to "the positive welfare consequences" of the intended commercial activity "for economic, social, and political life," for "improving the prosperity of individuals," and for the "enrichment of the entire area" mobilized "national economic reasons" for approving the application. Its indication that the factory lay so far away from Ludwigshafen that the city would never expand to reach it, combined with its limited descriptions of planned manufacturing processes, were meant to sweep away any reservations in terms of environmental policy.

This aspect, however, did not seem to affect on the decision-making process for the authorities, as was clear in the breakneck speed with which approval was granted. After positive expert reports from the construction authorities and the district health office (with the latter especially thin in terms of content) completed on May 5, 1865, followed by a short public hearing on May 6, the Speyer district office, which had authority over the concession, issued approval on May 8. It granted permission "to erect... on the so-called Hemshof field next to the Rhine, near Ludwigshafen, a chemical factory and brickworks." The concession was thus granted with the added proviso that the plans be executed exactly as had been submitted and, furthermore, that all governmental regulations and police ordinances that "in the general interests were deemed to be necessary at some later date

³² See documents in BASF UA, A 14/1/1 and 14/1/3 as well as A 11/2/7. On the following, reproductions of relevant documents are available in Werk and in the protocols of the provisional supervisory board of BASF in BASF UA, C111.

³³ Werk; Urkunden vol. 1, 20–21; and materials in A 13/1/2, A 13/1/3, and A 0/2/5. On the following, additional documents are in SALU, Abt. 2330, BASF I.

were followed precisely.” Just one week later, ground was broken for the construction of a factory, initially only for the manufacture of inorganic products. Basic permission to construct rail links between the factory site and the banks of the Rhine and to join up with the tracks of the state railway via a line passing along the main Rhine embankment followed on June 20, 1865.

It may therefore come as a surprise to learn that the new firm was entered in the commercial register in Mannheim on June 15, 1865. In fact, until 1919, the official and formal seat of BASF was in Mannheim, and the Ludwigshafen factory was listed in the commercial register in Ludwigshafen merely as a branch. Undoubtedly, Mannheim was a much more prestigious address by virtue of being an economic and – to an increasing degree – banking metropolis. In addition, the firm’s founders and its financial backers were quite literally at home here and were also well-connected to the economic middle class and the cultural ambience of the city. These factors may help explain why Mannheim remained the seat of the firm for so long.

The Large-Scale Project to Begin Anew in Ludwigshafen

Engelhorn and his cohorts fully exploited the chances presented for their new joint-stock company by the competition between not only Mannheim and Ludwigshafen but also, more indirectly, the Grand Duchy of Baden and the Kingdom of Bavaria. Between May and July 1865, the director moved quickly and deliberately to acquire the desired site near the Rhine, more than 13 hectares in all. The real estate itself to be sure cost nearly double the price of the Mannheim alternative, but, on the other hand, offered nearly ideal conditions for the planned facilities. The site’s placement to the north of – and well apart from – the city rendered possible conflicts regarding air and water pollution unlikely from the outset. The ground itself proved to be well-suited for construction. The Rhine provided large amounts of water and a place to get rid of wastewater easily. The Rhine embankment secured the low-lying site from high water and provided a foundation for rail tracks with connection to the main railway lines. Branch lines could easily be laid into the works and onto the banks of the Rhine, which, owing to a correction designed by Tulla, offered a long stretch of straight ground that served as a natural port. In addition, the city of Ludwigshafen demonstrated a willingness to improve the road access to the plant at its own cost. Good connections into superregional, indeed international, rail networks were guaranteed for the site, especially because the construction of a permanent, bridge over the Rhine, which had already begun, would also soon offer rapid, inexpensive transport toward the east and far beyond the borders of the German Reich.

Last but not least, Ludwigshafen itself offered an expressly industry-friendly climate. The relatively new town, which had only attained legal status as a municipality in 1853 and which was elevated to the status of city in 1859, had managed to become the most important spot in southwest

Germany on the left side of the Rhine in terms of transshipment between water and land transport. It had thus managed to establish itself as a smaller rival to Mannheim. By 1865, the number of inhabitants in Ludwigshafen had climbed to somewhere over 5,000. Only a few industrial plants had so far located there, characteristically, however, especially those from the chemical sector.

From the very start, BASF undertook planning on a scale that was previously unknown, but, as soon became clear, it was still quickly overtaken by actual developments in the industry. The long-term decision in favor of large-scale production, including all of the necessary preproducts and intermediates, on an extensive and easily extended site was clearly the most significant step in the direction of the unchallenged position of leadership enjoyed by BASF in the coal-tar dye industry over the next decades. The systematic thoroughness with which Engelhorn moved forward with the construction of the new factory after 1865 was, however, unique for its time. Indeed, it was only surpassed under the more advanced conditions of the 1890s when Carl Duisberg planned the new Bayer works in Leverkusen.³⁴

What is more, on the legal and financial side, BASF enjoyed a leadership position that was imitated by Hoechst and Bayer only in 1880 and 1881, respectively. The company form of the joint-stock corporation secured above all the rapid and flexible supply of capital in the event of necessary expansion of production facilities. But for BASF, this form proved advantageous for yet another reason, as evidenced in the first directory of shareholders:³⁵ In addition to influential members of the Mannheim economic middle class, other chemical firms and previous customers of the Mannheim aniline factory were important shareholders and thus bound more closely to the new corporation's interests.³⁶ Included among the stockholders were, for instance, the pharmacist Christoph Boehringer of Stuttgart (100 shares), a brother-in-law of Engelhorn's brother and co-proprietor of a quinine factory, F.C. Boehringer & Söhne. In 1870, this firm was to move from Stuttgart to Mannheim where it took over the site of the old aniline factory that had been founded by Engelhorn. Other stockholders included the Weinstainsäurefabrik Benckiser based in Pforzheim, which from 1858 had a branch in Ludwigshafen (30 shares); the firm of Heinrich Siegle, Stuttgart, which from 1863 was under the leadership of Gustav Siegle and soon became a partner of BASF (10 shares, with an additional 8 "for an ultramarine factory").

The distribution of shares to the firms of Rudolph Knosp (based in Stuttgart, 30 shares) and Dahl & Co. (based in Barmen, 10 shares) involved not just two valued customers of the products of the former Mannheim aniline factory. More than that, it clearly paved the way for an agreement

³⁴ On this, see Flechtner, Duisberg, 141 ff. ³⁵ Urkunden, vol. 1, 17.

³⁶ Verwaltungsrat April 4, 1865, BASF UA, C 111.

on placing limits on production areas with potential competitors and for cooperating with them as well. To be sure, the initiative for this did not come from Engelhorn, but rather from Rudolph Knosp in Stuttgart. On the basis of his knowledge of markets and people, the experienced merchant anticipated that in the future BASF would be able to produce fuchsin, or magenta, more cheaply “than any other” and feared in any case massive overproduction.³⁷ He was able to convince his business friend Dahl to enter into an agreement with Ludwigshafen that would ward off such a development as far as possible. Already on June 1, 1865, the three firms were able to bring their discussions to a mutually satisfactory conclusion: Knosp and Dahl ceded to BASF the rights to all manufacture of aniline and hydrochloric- or arsenic-acid-based red aniline (fuchsin). They also agreed to sell only BASF products in this area. In return, BASF agreed that it would not bring any other dyes produced from fuchsin (violet and blue shades) onto the market.³⁸

This agreement, which had to be renewed each year, secured for Knosp and Dahl not just the market in BASF aniline and fuchsin at stipulated prices but also provided a good basis for these firms’ own production of certain aniline dyes. BASF, on the other hand, was able to concentrate fully on the construction and expansion in particular of its inorganic department, without having to tie itself down in the longer term. The contract thus marks one of the earliest examples within the coal-tar dye industry of an agreement to divide the market, something that in the coming decades would feature more and more prominently in the industry as a way of avoiding undesirable competition. For BASF’s development in particular, the contract took on special significance during the following two and a half decades by strengthening the Ludwigshafen-based firm’s ties to Knosp in Stuttgart (in spite of occasional friction), thus paving the way for an eventual fusion, which occurred in February 1873. A contract with Dahl dated March 20, 1873 similarly followed the “guiding principle” that “direct competition” between the two firms should be avoided, and even after the fusion, Dahl & Cie., with its own “extended customer base,” remained a valuable customer for BASF.³⁹

Engelhorn was able to exercise the considerable freedom of maneuver that had been granted to him as leader of the firm by the administrative council in the interest of the young corporation. The rapid construction of required buildings in Ludwigshafen concentrated at first on production facilities for the inorganic materials needed by the firm, as had been specified in the original concession. In October 1865, production of nitric and arsenic acids began,⁴⁰ in spite of the fact that no explicit permission had been given for the latter, which involved a highly toxic manufacturing process. The production

³⁷ Knosp to Dahl, April 25 and May 15, 1865, BASF UA, A 15 I/5.

³⁸ BASF UA, A 15 I; see also Urkunden, vol. 1, 25.

³⁹ BASF UA, A 15 (previously A 19/1/4) as well as A 15 I.

⁴⁰ Verwaltungsrat October 16, 1865, BASF UA, C 111.

of the other required starting materials – sulfuric acid using the lead-chamber process, soda using the Leblanc process, caustic soda, sulfate, hydrochloric acid, calcium chloride⁴¹ – came on-line by the middle of 1866. Within a few years, initially planned levels of output had been exceeded many times over.

On June 28, 1866, as the next phase of the establishment of the Ludwigshafen works, Engelhorn applied for a concession to build a facility for manufacturing aniline and aniline dyes, in all an ensemble of 10 buildings. He also applied for permission to build a gas factory “for the purpose of lighting of the entire locality of the factory.”⁴² Once again, the governmental review process for this application was a short one, lasting hardly more than a month, although prior to the official granting of permission on August 1, 1866, reports from the construction authorities and the district health office were carried out once more, and a public inquiry took place. As a matter of fact, several objections were made by some of the factory’s neighbors, registering their concern about possible damages arising from production in the new plants. But even if some difficulties were raised in conjunction with the disposal or storage of various waste products, there were no serious restrictions placed on the firm, just as had been the case a year earlier. The district medical officer, who had in the meantime also taken on a part-time position as a factory doctor in the service of BASF, used his expert report to take the opportunity to characterize the factory’s production of arsenic, which was already underway, as unproblematic. What is more, he viewed as completely safe a practice that had been used in Mannheim, that of storing calcium arsenate in sheds with asphalt bottoms. Sensitivity about possible environmental damages appears at least in this case to have lagged well behind even contemporary norms.

In matters related to the facilities themselves, Engelhorn and his technical directors had made careful plans. The chairman of the administrative council, Seligmann Ladenburg, was able to report to the first general assembly of stockholders on October 15, 1866 “that the transfer of the aniline and fuchsin plants from Mannheim to our factory near Ludwigshafen [had] already [been] completed.” Furthermore, he insisted that all production was now concentrated there in a cost-efficient manner.⁴³ The production and cost calculations of the firm’s founders had worked out completely, and the share capital that had been paid in permitted the construction of even larger facilities than initially planned. Consequently, interest payments, which had been forecast at 5 percent, could be paid without any problem whatsoever from the plant’s profits.

⁴¹ Glaser, *Erlebnisse*, 16; von Nagel, *Fuchsin*, 15 ff.

⁴² Reproductions of the relevant documents are in *Werk* (1940); *Urkunden*, vol. 1, 28–29. Further documents are in *BASF UA*, A 13/1/4. See also Andersen, *Technikfolgenabschätzung*, 248–249.

⁴³ *Urkunden*, vol. 1, 31.

An image of the factory as it would have presented itself to a visitor at about this time was later captured by Otto Bolhagen. Even in this early stage of development, it is not difficult to recognize the carefully thought-out conception that lay behind it. In retrospect Carl Glaser, who joined the firm in 1869, celebrated from his expert perspective the “grand, highly directed, and entrepreneurial spirit” that was mirrored in the factory and its facilities. One could easily recognize “Friedrich Engelhorn’s lion paw,” the mark of its “future-oriented, daring, and strong-willed creator.”⁴⁴ Thus this was indeed a pilot plant, since there were no other prototypes for Engelhorn to rely on orientation. On the other hand, one should not assume anything special about the buildings themselves. Construction took place quickly and cheaply with the most basic materials. Firewalls were relatively rare among the mostly one-story buildings, which were generally also constructed without cellars. The outside walls amounted to no more than “wooden Fachwerk filled with bricks and festooned with wood on the one hand or freestanding wood frames on the other.”⁴⁵ Newly required buildings, once permission had been granted, were simply added to existing stock using the existing building scheme.⁴⁶

From Imitation to Independent Research – Heinrich Caro

The company developed at a truly breathtaking pace, carried along in part by the generally favorable upturn in the economic cycle that took place against the background of the process of German unification, which as it turned out developed along “small German” lines, excluding Austria (1866–71). The workforce, originally envisaged to be about 400 workers, grew beyond this already by late 1867, while production had reached nearly three times its originally intended volume by 1867/68.⁴⁷ The range of products also grew by leaps and bounds. Every year newly discovered dyes were added to the originally limited palette. A price list from 1873/74, for instance, catalogued 21 different categories of dye, most of which had several products within them, which amounted to a total of 81 products in all.⁴⁸ At first, these consisted only of imitations, but the situation began to change quickly in this regard after 1868.

Engelhorn, who had once gone so far as to try to obtain advanced methods of fuchsin manufacture from competitors in London through industrial

⁴⁴ Glaser, *Erlebnisse*, 15–16. ⁴⁵ VT I, 129.

⁴⁶ A large amount of documents on this are in SALU, Abt. 2330, BASF I and II; in addition, see BASF UA, A 13/1/7ff.

⁴⁷ Report of Ladenburg to the general assembly of stockholders, 1868, BASF UA, C 111.

⁴⁸ For example, there were 7 different Magenta products, 12 blue products soluble in water, 9 different types of water-soluble methylene violet and methylene green, and so on: VT, *Tri-Farben*, 66–67; slightly differently reported in VT I, 149 ff.

espionage (an attempt that ended in wretched failure),⁴⁹ set off from 1867 on a course of innovation that was successful in the middle and long term. He did this initially through purchasing production processes developed elsewhere, and later through BASF's own research.

Early on, licensing contracts with the French chemist Jean Théodore Coupier enabled BASF to deploy the (nitrobenzene) process developed by Coupier in the manufacture of fuchsin, thus avoiding what had been necessary previously, that is, the application of toxic arsenic.⁵⁰ The same strategy enabled the firm to use Coupier's processes for the production of pure aniline, toluidine, and induline dyes.⁵¹

However, much more significant than such licensing agreements was the decision to employ scientifically trained personnel not just for technical facilities and in the supervision of production – this work was done for the most part by the Clemm brothers. Instead, such qualified personnel were especially brought to bear on the improvement of production methods and on the development of new dyes. Thanks to pioneering theoretical work beginning in the late 1850s, especially that done by August Wilhelm Hofmann and Friedrich August Kekulé, it became possible to do systematic research in the area of organic chemistry, and in particular dyestuff chemistry. Such systematic research promised rich yields well beyond those offered by mere experience and tacit knowledge or by the hitherto much more accidental synthesis of dyes. The leadership of BASF was able to exploit this situation with a fine feeling for future developments.

There was hardly another German chemist who represented so completely the close connection between scientific theory and industrial technology as Heinrich Caro (1834–1910).⁵² He has consequently been characterized for good reason as the “father of industrial research in the German chemical industry.”⁵³ Trained as a chemist and colorist at the Royal Commercial Institute in Berlin, Caro moved to a cotton-printing plant located in Mühlheim on the Ruhr River. During the period 1859–66, he assembled a rich range of experience with the new coal-tar dyes as a salaried worker, and eventually as a co-proprietor, of Roberts, Dale & Co. in Manchester. It was there that he developed a new process for the manufacture of mauve already in 1860. By 1862, he had discovered an aniline black and, together with the Hofmann student Carl Alexander Martius, whom he had hired into his firm, had synthesized several dyes (or else had solved technical problems

⁴⁹ Glaser, *Erlebnisse*, 13; this account is corrected in Reinhardt, *Forschung*, 64.

⁵⁰ November 24, 1868. On the manufacture of Magenta using arsenic acid, see Andersen, *Technikfolgenabschätzung*, 229 ff.

⁵¹ Contract of January 8, with addendum of January 9, 1869, in BASF UA, A927; VR from January 14, 1869, BASF UA, C 111.

⁵² On Caro, in addition to BASF UA W 1, see in particular Reinhardt, *Forschung*, and now more exhaustively Reinhardt, Travis, *Caro*, which has extensive citations to relevant literature.

⁵³ Reinhardt, Travis, *Caro*, 126. On the cooperation between universities and industry in general, see Borscheid, *Naturwissenschaft*, in particular 111 ff.

associated with their manufacture) during 1863/64. These included induline, Martius (or Manchester) yellow, and Manchester brown or Vesuvin.

For health reasons, Caro returned to the continent in 1866 and worked for a time with Robert Bunsen in Heidelberg. Acquainted with the Clemm brothers, he made closer contact with BASF in the summer of 1867 when the production processes of three of the coal-tar dyes he had helped develop he transferred German rights to the company in return for a basic payment of 500 guilders and 10 percent of profits. Naturally, the firm wished to purchase future discoveries in order to use them in Germany, while Caro kept the rights for England and France.⁵⁴ Soon thereafter, however, the most important step for BASF toward a future based heavily on scientific research occurred: In the coming autumn, Engelhorn succeeded in hiring Caro as a “co-leading technical director” and leader of the experimental laboratory, which remained for the present in Mannheim. Here, Caro also dealt with improvements in production processes and with the investigation, purchase, and development of new products.⁵⁵

It was thanks to Caro’s activity that Ludwigshafen is regarded as the birthplace of a new industrial research strategy, the intensity and success of which was rivaled by even the most important of BASF’s competitors only years later. The importance of the decision of 1868 was surely not immediately known to the main actors, but already in 1869 Caro had discovered Palatine orange as a new dye-shade and was able in the very same year to file a patent for obtaining benzene from lighting gas (benzene wash) as the first ever BASF patent.⁵⁶ Without Caro, his scientific genius, his numerous, often friendly connections to the world of the English chemical industry (e.g., to W.H. Perkin), and his familiarity with many eminent scientists of his time, it is hardly likely that BASF would have seen the successes it did in the coming years. These included among other things the large-scale manufacture of alizarin. Starting from the standpoint of industrially oriented research, Caro kept up unusually intensive contact with relevant university institutes and thus ensured that BASF would have access to especially capable young representatives of the, at that time, still very new discipline of chemistry. Thus it was only understandable that the directors of BASF did everything they could in the following decades to retain this man in their firm as a guarantor of scientific progress and numerous patents, this in spite of the fact that his research output slowed considerably beginning in the middle of the 1880s. Even then, though, he remained extremely valuable to the firm as an expert in patent questions that, owing to their complexities and their significance for economic success on domestic and foreign markets, were often

⁵⁴ June 17, 1867, BASF UA, C 627/1.

⁵⁵ VR from October 4, 1868, BASF UA C 111. The contract with Caro from October 14, 1868 is in BASF UA, C 627/1, and a copy of it is in Wiedenmann, Konstruktion, II, 292–293. On the contract and its objectives, see Reinhardt, Travis, *Caro*, 137–138.

⁵⁶ Materials on this are in BASF UA, E 1/2; Urkunden, vol. 1, 35.

extremely controversial (see section 3 of Part I). At the beginning of 1884, Caro was finally appointed as a director, and after leaving the firm at the end of 1889, he joined its supervisory board, which he belonged to until his death in 1910.

The First Synthesis of a Natural Dyestuff: Alizarin

The decisive starting point for the new industrial research strategy was the first synthesis of a naturally occurring dye, madder red (Turkish red), itself the outcome of a directed research program. Beginning in the 1850s, chemists sought to unlock the secrets of the madder root in order to synthesize its highly prized red substance in the laboratory.⁵⁷ After all, in view of its worldwide sales value of at least 45 million marks per harvest, there were immense profits to be made. Finally, at the beginning of 1868, the dye's structure was worked out by Carl Graebe (1841–1927) and Carl Liebermann (1842–1914), two research students of Adolf (von) Baeyer (1835–1917) in Berlin. Just 11 months later, they were able to patent their path-breaking discovery, the manufacture of alizarin from anthracene, in Prussia, France, and England.⁵⁸ Obviously, the task of developing a profitable process to deploy in industrial production – something that revolved around the need to find a suitable substitute for the expensive bromine used initially – still had to be solved. At first, the inventors offered their patents to Hoechst, but the firm hesitated since it was confident that it would soon have its own solution to this problem of synthesis. (Owing to the work of Ferdinand Riese, the firm was actually on the verge of this.)⁵⁹ The firm of Potter & Co. in Manchester, on the other hand, which was also offered the patents, did not seem up to the task.⁶⁰

So it was that BASF came into the picture. Once again, Engelhorn chose the method of binding the inventors to the firm contractually through an agreement signed on May 29, 1869. They agreed to turn their patents in the three countries over to the company, which in return awarded them 3 percent of total turnover from sales of the product for the following 15 years. The inventors also had to support BASF in improving the finishing process.⁶¹ For this reason, Graebe worked for a short time with Caro in the Mannheim laboratory, and Engelhorn meanwhile authorized construction of

⁵⁷ See Reinhardt, Travis, *Caro*, 140ff.

⁵⁸ See Schmorl, Baeyer, 60 ff, and Vaupel, Graebe, 122 ff. The following is based on Travis, Rainbow Makers, 168 ff; Reinhardt, Travis, *Caro*, 140 ff; Patent from March 23, 1869 in Urkunden, vol. 1, 36.

⁵⁹ See Dokumente, H. 1. ⁶⁰ See Schuster, Wissenschaft, 28.

⁶¹ On the contract, see Vaupel, Graebe, 147 ff. The text of the contract is reprinted in ibid., 642 ff. The original contracts from 1869/76 are in Urkunden, vol. 1, 38, with copies in BASF UA, I 1101/3.

a pilot plant.⁶² After considerable teething pains, a happy accident led to the decisive breakthrough: On the basis of an unplanned and uncontrolled laboratory experiment, Caro came to the realization that inexpensive sulfuric acid could be used to bring about the reaction rather than the bromine that Graebe and Liebermann had required.⁶³ On June 25, 1869, Caro and his two Berlin colleagues were issued with a patent in England for the sulfuration or sulfonation process that they had discovered, just one day before the coal-tar dye pioneer Perkin applied for a patent for the very same method.⁶⁴ In order to avoid a legal battle that would have been damaging to both sides, and after extensive negotiations, Engelhorn and Perkin reached an agreement on March 13, 1870 to jointly produce alizarin for the especially lucrative English market.⁶⁵ With this relatively early contract, BASF extended its reach for the first time beyond the narrow confines of the German market. At the same time, however, more intensive cooperation with its English partner did not come about. The two firms produced and sold independently of one another. Nonetheless, BASF was thereby able to obtain valuable information from the much more technically versed W.H. Perkin on successful purification of anthracene and on the manufacture of anthraquinone from this substance.⁶⁶

The synthesis of madder red constituted a decisive breakthrough for the coal-tar dye industry into the existing dyestuffs market. After all, the aniline dyes that had been discovered to that point were superior in terms of purity and brightness of the color tone but could not compete at all in terms of genuineness of color with natural dyes, especially with the most significant of them, madder red and indigo blue. Synthetically produced alizarin, however, was decidedly superior to the expensive natural product, reaching at least the same level of quality, but with broader nuances of shade and greater speed and simplicity of application. It promised, therefore, correspondingly high profits. But, at the same time, BASF was not able to capture all of the profits from the patent. The process, it is true, was protected in England, in the United States, and eventually also in France, but not in Prussia. There, the responsible authorities decided that industrial development of an already patented process could not be held to be the result of independent “inventive thought.” It was therefore possible for other firms to move into alizarin manufacture, most importantly the Hoechst dye works, where practically simultaneously and independently Ferdinand Riese had found the same path

⁶² VR from June 4, 1869, BASF UA, C 111; Schuster, *Wissenschaft*, 29 ff.

⁶³ Vaupel, Graebe, 152–153, 159 ff. For a different view, see, Reinhardt, Travis, *Caro*, 148–149.

⁶⁴ The texts of the patents are in Vaupel, Graebe, 653 ff.

⁶⁵ VR from January 2 and March 13, 1870; Vaupel, Graebe, 154 ff; Travis, *Rainbow Makers*, 180 ff.

⁶⁶ Glaser, *Erlebnisse*, 14, 38–39, 41, 43–44; Reinhardt, Travis, *Caro*, 151–152.

to alizarin production. But the same was true of Bayer, and also for some small and very small producers, the precise number of which is difficult to gauge. In Elberfeld in 1873, for instance, in addition to Bayer there were six other such “factories.”⁶⁷ These circumstances might help explain Ludwigshafen’s not especially noble behavior with regard to the two inventors of the process: instead of the initial promises made to them in the original contract, they were given a one-time golden handshake of 63,500 marks each in 1876.⁶⁸

In view of the unexpectedly rapid competition presented by other producers, it was even more important than otherwise to optimize the industrial manufacture of the highly prized alizarin. BASF, however, found this especially difficult at first.⁶⁹ For this reason, Engelhorn sought help through hiring further highly qualified chemists, especially since it did not prove possible to engage Graebe in the industry on a longer-term basis. One of the most important of these new hires was Carl Glaser (1841–1935),⁷⁰ who entered into service at BASF in October 1869 on the recommendation of his friend, Graebe,⁷¹ after a five-year assistantship with Kekulé and after acquiring his second doctorate and the eligibility for a professorship at the University of Bonn. He was followed by his friend Heinrich Brunck (1847–1911),⁷² who, after studying with Kekulé and earning his doctorate in Tübingen, had already spent two years in the von de Haën chemical factory. Brunck was now put to work on improving the fabrication of benzene and aniline. In the years that followed, Glaser, who had been brought in as a support to Caro in his laboratory, solved the painstaking problem of slowly but surely increasing yields of alizarin through improved production methods. He did this at least in part under extremely primitive conditions, which were exacerbated by the not always easy cooperation with Caro and by quarrels in the boardroom.⁷³ In 1872, he took over the position as head of the newly created alizarin department.⁷⁴ But it was only at the end of 1875 that the long-sought endpoint of the development process was reached and that Engelhorn became

⁶⁷ Flechtner, Duisberg, 58.

⁶⁸ Vaupel, Graebe, 149 ff. The texts of the contracts is in *ibid.*, 644 ff. AR October 26, 1876.

⁶⁹ On the following, Reinhardt, Travis, *Caro*, 152 ff.

⁷⁰ On Glaser, in addition to his unpublished memoirs in BASF UA, W 1, see Anschütz and Müller, Glaser.

⁷¹ See letters from Graebe to Glaser, which for the most part discuss scientific questions of mutual interest and joint work between 1870 and 1919, with a concentration on the years 1870–82, copies of which are in BASF UA, X 21.

⁷² On Brunck, see especially Glaser, Brunck, and another publication based on that, Saftien, Brunck. See also the obituary by A. Berndsen and O.N. Witt. Contracts between BASF and Brunck are in BASF UA, C 627/3–10.

⁷³ Glaser, *Erlebnisse*, 37 ff, 40 ff, 55 ff, 83–4, 87, 91 ff; Schuster, *Wissenschaft*, 30, 34 ff; Vaupel, Graebe, 158–159, 165 ff.

⁷⁴ Glaser, *Erlebnisse*, 54–55; Travis, *Rainbow Makers*, 184 ff.

convinced that from now on it would be possible “to maintain competitiveness in alizarin very easily.”⁷⁵

Even though the six-year period on the way toward large-scale production of alizarin involved the overcoming of many and considerable hurdles, even the relatively modest amounts of the product that BASF could initially put on the market yielded rich profits, mainly thanks to strong demand and high initial prices. The fate of the madder root, which was cultivated on large agricultural areas in southern France, Alsace, and Holland and which had represented a major export commodity, was now sealed. By 1876, this production had disappeared almost entirely from statistics on agricultural cultivation. Instead chemical firms, especially in Germany, began to sell larger and larger quantities around the world, although this of course at rapidly falling prices. Already in 1877, production in the industry reached 750 tons [please note that all references to tons are to metric tons and that the term “billion” is used in the American sense: a value of 1,000,000,000 (i.e., 10^9)] of pure dye, thus exceeding the largest yearly production level, which had previously been attained (using 50,000 tons of madder roots).⁷⁶ In the course of the competition for the favor of consumers, BASF was therefore able to increase its proportion of German production fairly quickly from 11–15 percent at first to approximately one-third.

The path from discovery to development and eventually to large-scale manufacture of alizarin proved, even more impressively than had the discovery of the first aniline dyes that the most sustainable way to ensure economic success in the coal-tar dye industry was science-based development of new products and processes. Engelhorn, who developed the reputation for squeezing his employees “like lemons,” only to let them go,⁷⁷ realized the consequences of this and carried through with typical cold-bloodedness. He drove Julius Giese, the longtime head of the inorganic department, out of his position, presumably because Giese, as a pure empiricist, was not at the scientific level of his time.⁷⁸ When the company patriarch replaced Giese with Carl Clemm as head of the inorganic department, however, he also helped solve a personnel problem within senior management at BASF. The Clemm brothers, after all, had managed to alienate one another to such a point that they had become outright enemies,⁷⁹ and the clear delineation of their responsibilities relaxed the situation, at least in a business sense.

One year previously, Engelhorn had reorganized the sales of excess production of inorganic materials through an agreement with the Verein Chemischer Fabriken.⁸⁰ Insofar as the one-time rival took over sales of such products for both firms for the next 10 years, it was able to avoid ruinous competition

⁷⁵ Engelhorn to Siegle, December 28, 1875, BASF UA, A 15/1.

⁷⁶ Caro, Reden, 57. ⁷⁷ Glaser, Erlebnisse, 9. ⁷⁸ Ibid., 16–17. ⁷⁹ Ibid., 17–18.

⁸⁰ Draft contract and final agreement from March 26, 1870, in BASF UA, A 15 (previously A 19/1/8).

in its original area of production, this to mutual benefit. At the same time, BASF, in contrast, sold dyestuffs, its main product, to an apparently still receptive, indeed actively interested, market, generally by means of firms that were also its shareholders. Most of this was carried out by Rudolph Knosp in Stuttgart and by Dahl & Cie. in Barmen, which meant that, in Ludwigshafen itself, just four salaried managers, or “*Beamte*,” were sufficient to deal with all of the business that arose from this, whether correspondence, invoices, or bookkeeping for sales and purchases, all of which were by this time European in dimensions.⁸¹

In 1870, Engelhorn sold the industrial site in Mannheim, which was no longer needed, at a profit to the firm of C.F. Boehringer & Söhne. At about the same time, between 1870 and 1872, he expanded the firm’s real estate basis in Ludwigshafen by fully eight hectares, which were for the moment remained undeveloped, but could accommodate future expansion. In view of the explosive expansion of the firm as a whole, the construction of apartments for workers, which began in 1871, served the purpose of placing the continuously rising demand for workers who would be loyal to the firm on a secure basis: the number of workers reached a level of more than 600 by the end of the Franco-German war.

The performance and success of the firm, which was only temporarily weakened through the war, were mirrored in the company’s end-of-year results. Using the 1866/67 business year as a reasonable starting point, since by this time manufacture in Ludwigshafen was fully operational, the firm’s turnover tripled almost exactly within the following five years, with coal-tar dyes exceeding this level by some degree, and inorganic products (which were primarily used internally) coming in somewhat under this level. As evidenced in the final balance sheet for 1871/72,⁸² aniline dyes determined much of the firm’s business, coming in at 55 percent of total turnover, but this was only shortly after output of alizarin dyes, which already accounted for more than 10 percent of turnover, had begun its sharp upward trajectory in the period following the start of manufacture in May 1870. Two-thirds of the turnover in aniline dyes was accounted for by fuchsin, which occupied first place, followed by Hofmann’s violet (8 percent) Palatine orange (6 percent) and 10 other dye shades. Without doubt, the mineral dye chrome green, the much-prized substitute for the toxic Schweinfurt green for printing of wallpaper and linen, remained at this time more important even than red alizarin. The turnover in chrome green reached almost half that of fuchsin and was a major factor in ensuring that inorganic products accounted for well over a third of total BASF sales.

Just how favorably business developed is evident, among other things, in the decision of the general assembly of shareholders in 1869 to trim the

⁸¹ See Jacob, Ladenburg, 29; Glaser, *Erlebnisse*, 65.

⁸² Data are in VT I, 208–209.

original share capital of the firm by a fifth, from 1.4 million to 1.12 million guilders (the guilder was worth 1.71 marks at that time). This was due to the fact that, in spite of permanent outlays for new investment, income was so healthy that the money was simply not needed.⁸³ During the first seven years of the new corporation's existence (1865–72) – when the factory was still under construction – total sales amounted to nearly 21 million marks, with a gross profit of more than 6 million marks and a net profit of just under 2.9 million marks. The latter amount was more than one and one-half times the size of the share capital. It should also be noted that Engelhorn and his administrative council exploited the freedom of maneuver available within the legal framework, in order to keep the profits announced in balance sheets as small as possible, instead pouring money into an official reserve fund and into extensive hidden reserves. Write-offs, which amounted to 52 percent of the gross profit, were used to cover a large part of the self-financed construction and expansion of the works.⁸⁴ A glance at the corresponding accounts confirms this. The value at the time of purchase of real estate, buildings, apparatus, and machines rose by mid-1872 to 3,949 million marks, more than two and a half times the value of the share capital as altered in 1869.

Measured against the actual profits therefore, the dividends on share capital remained within relatively modest limits. They stayed constant at the guaranteed 5 percent during the first two years, before turning sharply upward in the following years, reaching a very considerable 25 percent in 1872. On average, the nominal interest rate for share capital during each of the first seven years amounted to about 14 percent.

On an Expansion Course: The Fusion with the Stuttgart Firms of Knosp and Siegle in 1873

The “crash” of 1873, the consequence of the overheated speculation during the short period of euphoria following the unification of Germany in 1871, did not leave BASF unscathed. However, it did little to change the successful trajectory of the company. What is more, just a few months before the massive stock market crash, BASF had already made one of the most decisive steps in its early history. Its fusion with the two Stuttgart-based firms of Rudolph Knosp and Heinrich Siegle.⁸⁵

⁸³ Extraordinary General Assembly of October 23, 1869; July 28, 1870, entry in Handelsregister, GLA 276/1302.

⁸⁴ See reports by Ladenburg before the general assembly of stockholders starting in 1868, in BASF UA, C 111.

⁸⁵ On the following, see VT I, 213 ff; Schuster, Farbenhandel, 52 ff; Schröter, Engelhorn, 165 ff.

Starting in 1845, the merchant and factory owner Rudolph Knosp (1820–97)⁸⁶ successfully headed up the firm he had founded “R.E. Knosp, Chemical-Technical Articles, Indigo, and Crimson Dyes.” In 1859, he managed to gain the contractual rights for the next seven years as exclusive sales agent for Perkin’s mauve in the German confederation, Austria and Prussia, the Netherlands, Belgium, France, and Switzerland.⁸⁷ He developed a cheaper process for manufacture of fuchsin in the same year, which he had patented in Württemberg and, on November 15, 1859, in England.⁸⁸ During the years that followed, he was able to expand the assortment of colors he was able to offer through further processing of fuchsin into other synthetic dyestuffs (violet and blue shades). At the 1862 London World Exhibition, he was awarded a medal that recognized “the outstanding quality” of his products. From the very beginning of his activity in this area, the Württemberg-based dyestuffs pioneer enjoyed a close business relationship with BASF, both as a stockholder and as a dependable partner in contracts. What is more, since he sold nearly two-thirds of BASF’s dyestuffs range, he – unlike the Ludwigshafen company – also had the best contacts to the end users of the materials in dye and printing plants.

Knosp’s rival, located right on his doorstep and 20 years younger, was the dye manufacturer Gustav Siegle (1840–1905),⁸⁹ who, starting in 1863, was the proprietor of the firm founded by his father, Heinrich Siegle. The elder Siegle, a pharmacist, had manufactured mainly dyestuffs, paints, and paint colors on an organic basis in his factory. He also produced pigment dyes. Gustav expanded the firm’s program with a broader palette of mineral dyes. When he became familiar with the new coal-tar dyes through customer demand within the sector and was egged on by news of their high regard at the Paris World Exhibition of 1867, he began producing them on his own. Water pollution problems in Stuttgart prompted him to establish a branch plant in Duisburg on the Rhine in 1868, where he manufactured, among other things, vermillion and the highly sought-after nontoxic chromium green. A few years later, he planned to produce alizarin. The well-traveled salesman and talented organizer was more familiar with the international market than the head of BASF, indeed even better than Rudolph Knosp, who prided himself on his proximity to his customers. Gustav Siegle was at home in Paris and London and had already cultivated well-functioning connections within Europe (Russia and Sweden) and in the United States. As of 1861,

⁸⁶ On Knosp, see in particular Jacob, Knosp; Schuster, Farbenhandel, 27 ff.

⁸⁷ A reproduction of the contract is in Urkunden, vol. 1, 1; Zimmermann, *Über die Grenzen*, 64–65.

⁸⁸ A reproduction of the patent notification is in Urkunden, vol. 1, 2; Zimmermann, *Über die Grenzen*, 66–67.

⁸⁹ On Siegle, see Pilots, Siegle. The following is based above all on 41 ff, 60 ff. See also Schuster, Farbenhandel, 60 ff.

he even had a sales office in Milan. It was through these experiences that he came to recognize early on the dangers in heightened competition owing to impending overproduction. Furthermore, as a stockholder in BASF from the very start, he was undoubtedly keenly aware of the strengths of the Ludwigshafen firm.

The merger of three such fairly unequal partners was in no way self-evident. Clearly, the BASF leadership was interested in getting rid of potential competitors. But it was more important still for the firm's directors, especially in light of the firm's high levels of performance and potential on the production side, to build up direct contact to both domestic and foreign customers, something that had hitherto been avoided. In this way, the company would be able to secure and hold as large a market share as possible. After all, in view of the growing variety of dyes and ever-increasing competition, continuous flows of information on the changing preferences of consumers as well as customer advising took on greater and greater significance. This, indeed, was the essential precondition for getting customers to become committed as intensively as possible to a firm's own products, especially as the seller's market began to transform into a buyer's market.⁹⁰

For Engelhorn, the most obvious step in view of the close and long-standing business relationship with the Knosp firm was to bind it and its commercial know-how more closely to Ludwigshafen, thus taking the shortest path toward overcoming his own firm's deficit. As the first negotiations began, it seemed that there were very good chances that such a solution might be possible. But if the Siegle firm came into play in autumn 1872 just in the nick of time, eventually actually displacing Knosp as first choice, this was mainly owing to the intervention of a friend of Gustav Siegle, Dr. Kilian Steiner (1833–1903).⁹¹ An unusually versatile co-founder and director of the Württembergische Vereinsbank (which gained state approval in 1867 and opened its doors in 1869, soon becoming a center for industrial financing in southwest Germany), Steiner numbered among the leading bankers in the young German Reich. He was a key figure in the founding of the Rheinische Creditbank (1870) and the Rheinische Hypothekenbank (1871), both headquartered in Mannheim. It was undoubtedly through these organizations that he got to know Engelhorn better, since Engelhorn sat on the supervisory board of the Creditbank from its founding and was also involved in the Hypothekenbank. Steiner was therefore able to act successfully in the end as an ideal and competent middleman between the two competing Stuttgart-based firms, between the politically different heads of each of them, and between Ludwigshafen and Stuttgart. On February 5, 1873, an extraordinary general assembly of BASF stockholders ratified unanimously the agreement that was

⁹⁰ See Kreutle, *Marketing-Konzeption*, 121.

⁹¹ See Schenk, Steiner. Further materials are available in BASF UA, W 1 Steiner.

reached by the three company chairmen just a few weeks earlier, including the new statutes of the firm.⁹²

The subsequent addition of the phrase “in Ludwigshafen on the Rhine and Stuttgart” to its name meant that the “Badische Anilin- & Soda-fabrik” took some account of the two smaller firms. The same was true of the additional placement of the Stuttgart horse with the traditional Ludwigshafen lion on the firm’s letterhead. BASF also registered the two heraldic beasts in its coat of arms in 1875 as a trademark and used them in advertising even into the period following the end of the fusion in 1889.⁹³

The basic capital for the newly expanded corporation was set at 18 million marks, of which the legal minimum of 16.5 million was put up. It was only in 1897 that this amount was fully used up (and, indeed, had to be increased) in order to raise money for indigo production. Knosp and Siegle were well-rewarded financially in the deal. Of the 27,500 shares that were distributed, each valued at 600 marks, the existing stockholders of BASF received 16,000 (58.2 percent), while Siegle obtained 5,714 (20.8 percent), and Knosp 4,285 (15.6 percent). Taken together with the 1,501 shares (5.5 percent) that Steiner took on behalf of the Württembergische Vereinsbank, the “Stuttgarters” (Knosp, Siegle, Steiner) thus possessed nearly 42 percent of the share capital. Moreover, since they largely retained this interest either personally or within their families, they possessed through their portfolio enormous influence within the firm, especially since by the mid-1880s, Engelhorn and the Clemm brothers had largely sold off their own shares.⁹⁴

The new financial arrangements were accompanied by the restructuring of the company: In the Siegle factory in Stuttgart, only two main lines remained in production. One involved the fabrication of pigment and paint dyes, needed above all for book printing and lithography, wallpaper and colored paper, artists’ paints, cotton printing, and wood and sheet-metal paints. The other was the manufacture “in order to round out the whole” of natural dyes that “could [not yet] be accomplished synthetically.”⁹⁵ Otherwise, the production of coal-tar dyes and the majority of inorganic materials was carried out in Ludwigshafen, although Siegle’s factory in Duisburg was also affected by the reorganization. Ludwigshafen took over the manufacture of chromium green and vermillion, and in 1874 the Duisburg establishment, under the leadership of Brunck, took over responsibility of purifying raw anthracene imported from England, which was the starting material for alizarin

⁹² Documents on this are in BASF UA, A 15 I, and also in A 12/1/7, A 12/1/8, and C 21. Further materials are in GLA 276/1302: *Verhandlungen des Aufsichtsrats vom 4.3.1873 betr. Errichtung einer Zweigniederlassung in Stuttgart sowie Ernennung des Vorstands und Ernennung der Prokuristen der Gesellschaft*.

⁹³ See BASF UA, A 12/3/1, as well as A 12/3/4 and A 12/3/5.

⁹⁴ In 1885, Engelhorn and Karl Clemm possessed only 10 shares each, while in 1886, August Clemm appeared at the general assembly as an owner of 28–31 shares.

⁹⁵ Bericht zur Generalversammlung von 1874, BASF UA A 15 I.

synthesis. Two years later, the factory was first leased and then purchased by the Duisburger Kupferhütte copper foundry, which used it for its own purposes. For Brunck, this new task represented an important transitional phase in his rise within the corporation in the aftermath of his successful work on the manufacture of pure benzene as the basis for aniline and fuchsin fabrication, but also after his unsuccessful attempts to build a good relationship with August Clemm, the leader of aniline fabrication at BASF.⁹⁶

From the perspective of Ludwigshafen, the fusion of 1873 brought about decisive advantages in particular through the fact that, by means of the sales offices in Stuttgart, “the direct contact with the customer base, which had been so sorely missed before . . . [was] established to its full extent.” What is more, this was accomplished without absorbing unnecessary energy or personnel “from the leadership of fabrication.” Thus, it was now possible “to recognize precisely and satisfy more easily the wishes of the consumer, which in the dyestuff industry are so important and decisive.”⁹⁷ To be sure, the spatial separation between production and sales was not unproblematic from a business perspective, but it offered to all concerned the feeling that they were relatively independent from one another and thus formed a key precondition for what was obviously a largely problem-free transition into the confederation. The sales office in Stuttgart, formed from the firms of Knosp and Siegle and set up and masterfully led by Siegle himself, maintained the connections both to old and new agents and sales offices in Germany, Europe, and overseas. Already in 1873 Siegle had traveled to New York in order to found a subsidiary in the United States together with the firm of Pickhardt & Kuttroff by means of a limited partnership.⁹⁸ This was the second foreign sales office, following the one that already existed in Milan, in which BASF became a silent partner by means of a contract signed on March 10, 1873.⁹⁹ The further construction of a worldwide sales system during the following decade and half was the great achievement of Gustav Siegle.

Changes in personnel at the top of the corporation clearly played a role in bringing the heads of the two Stuttgart-based firms on board, gaining additional expertise and market knowledge, and integrating BASF more intensively than before into the network of the southwest German financial world. The managing board was composed of Gustav Siegle together with Engelhorn and August Clemm. Under them were Carl Clemm, who served as a deputy member of the board, along with seven top managers with signatory authority, five in Stuttgart and two in Ludwigshafen. Knosp was named

⁹⁶ Glaser, Brunck, 9 ff, and Glaser, *Erlebnisse*, 20, 76–77.

⁹⁷ Undated report, clearly written on the occasion of the general assembly of 1874, BASF UA, A 15 I/10.

⁹⁸ Supervisory board from October 7, 1873, BASF UA, C 112.

⁹⁹ Supervisory board from April 19, 1873, BASF UA, C 112.

to the chairmanship of the new ten-man supervisory board, an office he held until his death in 1897. In addition to him, a number of other members of the supervisory board represented Stuttgart's interests: The publisher and industrial pioneer Eduard (von) Hallberger;¹⁰⁰ Gustav Müller, co-proprietor of the indigo and dyewares wholesaler J.G. Müller & Cie. who was also a friend of Steiner; and, above all, Kilian Steiner himself. Steiner repeatedly proved to be a well-connected and deliberate go-between in critical developmental phases of the corporation. Additional members were Hermann Rothschild (until 1899), who as director of the Württemberg Kattun factory in Heidenheim was quite familiar with the dye business. Among the Mannheim representatives, among whom a large number of business and personal relationships prevailed, it was the financial world that dominated. The banker Seligmann Ladenburg numbered among the leading members of the small founding circle for BASF. The attorney Carl Eckhard (1822–1910), who served as vice-chairman of the supervisory board from 1873–97 and as chairman from 1903–07, was co-founder and director of the Rheinische Creditbank in Mannheim. In that capacity, he was heavily involved in the establishment of the Rheinische Hypothekenbank in Mannheim and, later, of the Pfälzische Hypothekenbank in Ludwigshafen (1886) and the Deutsche Vereinsbank in Frankfurt. Eckhard was also involved in the founding of the Mannheim Insurance Corporation (1879) and of the Continental Insurance Corporation.¹⁰¹ Simon Hartogensis (1827–1905) was another man drawn from the circle of the Mannheim financial elite. Consul-general of the Netherlands, he served as a member of the supervisory board of the Badische Notenbank that was opened in Mannheim in 1870. Later, he was active as a co-founder of several insurance companies (Mannheim, Continental, Atlas Insurance Corporations).¹⁰² The secretary of the company, Carl Reiß, who was friends with Hartogensis, was the son of Friedrich Reiß and the son-in-law of Engelhorn, and served on the supervisory boards of the Rheinische Creditbank and the Rheinische Hypothekenbank.¹⁰³

3. BETWEEN SCIENCE AND THE MARKETPLACE – BASF IN THE “DYESTUFFS AGE,” 1873–1900

An Overview

Strengthened and reorganized in the ways we have seen in the last section, BASF continued on its course of expansion during the following decades, and it did so successfully and in virtually all areas. In doing so, however, it

¹⁰⁰ On Hallberger, see Berner, Hallberger, 288 ff.

¹⁰¹ See Eckhard, *Erinnerungen*; NDB 4 (1959), 293 (G. Jacob); Kirchgässner, Manager, especially 325 ff.

¹⁰² Schröter, Engelhorn, 144. ¹⁰³ Ibid., 161.

was not possible for the firm to simply settle into established patterns. This was something that the lively competition in the industry, in particular from Bayer and Höchst, the two other large-scale firms in the sector, refused to permit. Instead, BASF saw itself of necessity spurred on to continuous efforts at innovation. This experience was not without its effects on firm strategy. Indeed, it played a key role in the basic changes in management personnel between 1879 and the dissolution of the fusion with Stuttgart in spring 1889.

In institutional terms at least, the latter year represented a breaking point in the firm's historical development. But the departure of Engelhorn from the top management of the corporation, an event that occurred a few years before this, affected the firm much more deeply. The end of the "Engelhorn era" marked an end to a corporate policy oriented primarily toward rapid economic success and quick profits. With the beginning of the "Brunck era," the "age of the chemist" began in the top ranks of BASF. It was characterized by scientific competence, applications-oriented pragmatism, and longer-term planning for success.

The tough struggle to find a profitable route to the synthesis of indigo in the years 1880–97 serve as a classic example of the new corporate strategy. This strategy, of course, continued to center on the manufacture of dyes, which regularly accounted for at least – and often substantially more than – 80 percent of sales through 1904. Even the important discoveries that were made in the inorganic area, moreover, were at first made in connection with dyestuffs production. During these decades, the laboratories of BASF – and not only BASF – delivered a veritable cornucopia of new dyes in a previously unimaginable range of shades and applications.

It therefore seems justifiable to characterize the years from 1873 through 1900 as the "age of dyestuffs" and to treat them as a single unit. Naturally, a company that advanced to become a "giant factory" with over 1,000 employees within a single decade (1866–76) and just before the turn of the twentieth century exceeded the 6,000 mark (see Figure I.1) requires a multidimensional perspective on its history.¹⁰⁴ In many ways, it was integrated into relationships that extended far beyond the factory walls, and affected affairs in its broader environment, both near and far. It also sought to influence the existing basic political, legal, and economic conditions in the interests of its short-term or longer-term profit – or at least to use those conditions for its own ends by acquiring scientific know how, concluding marketing and market agreements, establishing subsidiaries abroad, or trying to influence economic policy decisions. What is more, as a complex economic and social organization, the firm had a differentiated structure of its own, which was subdivided hierarchically. It comprised a large number of factory units, which, despite their integration into the enterprise as a whole, produced

¹⁰⁴ On modern industrial history in general, see Pierenkemper, *Unternehmensgeschichte*.

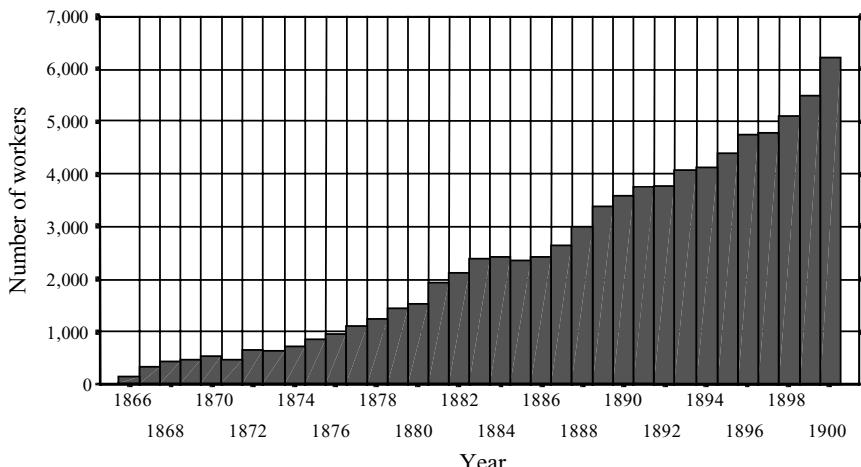


Figure I.1. Blue-collar Workers at BASF, 1866–1900.

next to one another on a practically independent basis. This meant that the company was faced with the task of regulating the flow of work within the “factory” as efficiently and as free of conflict as possible. It also had to care for the “sustainability” of its employees’ willingness and ability to perform at the highest levels.

The Centers of Development – Top Management and Organizational Problems

The rapid growth of the firm and its increasing complexity posed BASF with the problem of making sure that its organizational structure kept pace with these developments. The modern legal form of the joint-stock company provided the room for maneuver needed for this. The specific statutes of BASF’s company charter followed in general contours the increasingly precise legal requirements.¹⁰⁵ The interplay among the general assembly of stockholders, the supervisory board, and the managing board determined the direction in which the firm moved. The ideal-typical separation between the general assembly as the “organ of will,” the supervisory board as the “organ of supervision,” and the managing board (the direction) as the “implementation organ” of the corporation¹⁰⁶ was, however, somewhat divorced from practice, at least in the case of BASF. This was in large part because, especially in the early phase of the company, extraordinarily close personal relationships and personnel overlaps existed among the three organs.

¹⁰⁵ On the legislation, see in general Horn, *Unternehmensorganisation*, and additional articles in Horn and Kocka, eds., *Recht und Entwicklung*. The statutes of BASF are in BASF UA, A 12/2/1 and A 12/2/2, C 11.

¹⁰⁶ Meyer, vol. 1 (1893), 278.

All of the stockholders met actively once a year in the ordinary – and occasionally more often in the extraordinary – general assembly. The latter occurred, for instance, when especially important decisions had to be made, such as the fusion with the two Stuttgart-based firms, the rewriting of the statutes in 1885, and in the case of the planned raising of the capitalization of the firm at several points starting in 1897.¹⁰⁷ Normally, about 10 to 15 persons – and only very seldom more than 20 – were involved, at first in the Europäische Hof, but also for some time in Seligmann Ladenburg's house.¹⁰⁸ Later, the meetings were held in the rooms of the Rheinische Creditbank in Mannheim. Regardless of venue or number of participants, however, the idea was to run through the agenda within an hour.

In these meetings, the members of the managing board and the supervisory board represented in their roles as stockholders and proxyholders about 90 percent of the capital held by all those present; only seldom was more than a third of the total paid up capital represented in the firm as a whole. In any case, they possessed a much more intimate knowledge of the development of the business and had already come to some sort of agreement in the background about all necessary decisions. It was almost a sensation if an additional request were brought up – as was the case in 1874 and 1877, when the suggestion was made to move the entire sales organization to Ludwigshafen. In 1899, another unusual occurrence was a single no vote, which destroyed the usual picture of total harmony.

In contrast to the general assembly, the supervisory board, required by law for every joint-stock corporation starting from 1870,¹⁰⁹ was able to exert its influence in the company through its comprehensive and always effective right to control and direct the top figures on the managing board “in all areas.” The supervisory board named and dismissed members of the managing board and approved the hiring and firing of managers with powers to sign on behalf of the company. This organ also made decisions on acquiring or divesting real estate, on new construction, on acquisition of capital that had to be secured contractually, and on the establishment of branch offices.¹¹⁰ The small circle of people – in the end, a maximum of 11 in all – had a pivotal role within the terms of control, power, and decision making within the firm.

At the same time, the demands of office for a member of the supervisory board were held in reasonable limits.¹¹¹ Only during the critical years of 1881–3 did the number of meetings amount to 10, 11, and 14 per year,

¹⁰⁷ A somewhat incomplete collection of relevant documents is in BASF UA, C 21, although they are complemented after 1885 by minutes available in GLA 276/1302.

¹⁰⁸ Aktionärsrundbriefe from 1865–1873 in BASF UA, AC 93.

¹⁰⁹ See in general Hopt, Funktion.

¹¹⁰ Geschäftsinstruktion für den Vorstand und Geschäftsordnung für den Aufsichtsrat von 1873, BASF UA, C o/I.

¹¹¹ Minutes of the meetings are in BASF UA, C 112.

respectively. Otherwise, three to five meetings of one-and-a-half to two hours' duration sufficed to deal with the business for a full year. Mostly this was done by full consensus of all members, as evidenced by the continued appearance in the minutes of the little word "unanimously." Later, and stereotypically, the final sentence of the minutes of the supervisory board read: "All decisions were made unanimously." Records of pre-meeting discussions between the members of the factory managing board and the supervisory board are available in some cases; and these records suggest that such preliminary meetings were par for the course in order to limit material for discussion in the main meetings. What is more, the supervisory board was relieved of its work starting at the beginning of 1882, when the "delegation" (from November 1888, "committee") was formed.¹¹² This was a body to which, in addition to the chairman of the supervisory board, two, three, and eventually five other members of the board belonged. It was supposed to meet at least once every three months. In the first years of its existence, the delegation dealt intensively with the leadership crisis, which we will soon address in more detail. By statute, it also took part "in accomplishing important tasks associated with the business." The delegation also exercised control over the firm's top managers on behalf of the supervisory board, acted as a sort of go-between in communication between the managing board and the supervisory board, and became involved particularly in financial matters (such as checking the balance sheet).

The members of the supervisory board were of course elected by the general assembly of stockholders for terms of only three years in the first instance. Since, however, those involved were regularly renewed in their office "unanimously by acclamation," they were for all practical purposes members of the board until they died, or until they left of their own accord. In this way, an extraordinarily high level of continuity in terms of people and expert knowledge was guaranteed, something that occasionally spanned generations, as, for instance, when Carl Ladenburg succeeded his father Seligmann (1874–1903).¹¹³ Even more important, however, there were changes that came about in the early 1880s as a consequence of the discord within the managing board, matters we will come to shortly: At the beginning of 1884, Engelhorn and Carl Clemm moved from the managing to the supervisory board, although they resigned from this body just over a year later in July 1885. In the meantime, their adversary, August Clemm, was elected as a new member, this owing to the strong backing of Brunck

¹¹² See "Organisationsstatut der Badische Anilin- & Soda-fabrik in Mannheim," BASF UA, C o/I (copy). The first election of two "delegates" is recorded in AR, November 28, 1881. See also minutes of the meetings in BASF UA, C 113, which start with the meeting of June 25, 1885.

¹¹³ On Carl Ladenburg, one of the leading lights of the southwest German financial world, see Ladenburg, Leben; Jacob, Ladenburg.

and Glaser. In 1897, indeed, August Clemm even succeeded Knosp as chairman for several years. After the dissolution of the fusion between BASF and the Stuttgart-based Siegle firm, Gustav Siegle then brought his expertise into the supervisory board between 1889 and his death in 1905. It was in fact common practice for previous members of the managing board to take over advising and control functions in the supervisory board, something that applied to Heinrich Caro after 1890 and to Carl Glaser after 1895. In general, this practice helped improve cooperation between the supervisory board and the top management of the corporation.¹¹⁴

The most important position from which to exercise authority in the firm, and for day-to-day, and even basic business decision making was the managing board. For this reason, it is not surprising that it was at this level that conflicts erupted most frequently, conflicts that were conditioned by differences in temperament and age, the socialization of particular individuals, their education and experience, their relationship to the firm, and their estimates of its future perspectives. Given all of this, it was an important factor in the initial years of the existence of BASF that a strict division between ownership of and managerial control over the company did not really exist. A man such as Engelhorn saw himself not just as a shareholder, but also as the all-powerful company patriarch. To a certain extent, Heinrich Siegle embodied in his person the roles of an old-style entrepreneur and a modern manager. In 1873, after all, he had given up his entrepreneurial independence in return for commercial leadership of the firm. By virtue of his position as the company's biggest shareholder, however, he remained closely associated with its interests.

The Clemm brothers, on the other hand, do not seem to have shared this close identification with the firm. In fact, one gets the impression that the chemists who followed them and occupied leading positions, that is, Glaser and Brunck, identified themselves more strongly with the company than the two co-founders, even more so in fact than Engelhorn himself: The latter, when all was said and done, viewed BASF above all simply as a good investment. Glaser and Brunck – top managers from today's perspective – saw the firm to a large extent as their life's work, to which they felt tied not in the first instance through their (considerable) ownership of shares, but rather above all else through their work and performance. BASF therefore did not really conform at all to the model of a neat transition from owner-to manager-led firm.

Sooner or later, however, the scientific and technical demands of production and sales had to have an effect on the composition of the company's leadership – this trend in development was especially pronounced in the chemical industry. The decisive significance of research done within the factory

¹¹⁴ See L. Brunck, "Lebenserinnerungen" (unpublished manuscript), 67.

for business success became ever more evident as early as the 1870s. In addition to Heinrich Caro, Glaser and Brunck were especially important in this regard. These two – in contrast to the ingenious but chaotic Caro, who did not really take much interest at all in the commercial or even the technical side of the business¹¹⁵ – combined scientific qualifications with pragmatic entrepreneurial skill. They felt equally at home, and performed equally well, in the laboratory, working out production processes and taking over practical tasks when they worked outside of BASF itself. Brunck, for example, did a very good job of heading up the Duisburger Hütte (1874–6), while Glaser did the same when he helped establish the first foreign factory of BASF in Butirki, near Moscow, in 1877/78. It soon became obvious that they would soon assume greater responsibility in the Ludwigshafen factory, something which was also increasingly expected and striven for from their own perspective.¹¹⁶

In this regard, they were aided by the unedifying developments in the constellation of personnel at the top of the firm. Considerable tensions, after all, existed there between August Clemm on the one hand and Engelhorn, Caro, and Carl Clemm on the other.¹¹⁷ The enmity that had existed for years between the two unequal Clemm brothers was especially important in this regard, since it grew more hostile over time. Carl, the elder brother, was especially close to the company patriarch Engelhorn, to whom he was related through his wife. With regard to his position within the firm, however, he had to an increasing extent take a subsidiary role to his younger brother. August Clemm, more significant but also more difficult to get along with of the two founder-chemists, functioned from May 1869 onwards as Engelhorn's only representative with the power to sign on his behalf.¹¹⁸ August was also given the sole leadership of aniline manufacture and worked effectively too to improve financial control over, and the accounting systems of, the firm through enabling more precise cost calculations.¹¹⁹ This man, who possessed expert competence, common sense, and a skeptical attitude, was in fact the gray eminence of BASF. He worked behind the scenes frequently to set things right when Engelhorn and Carl Clemm “perpetrated poor or rash business decisions of any sort.”¹²⁰ In contrast to “the founder and speculator” Engelhorn, August Clemm had a good feel for the growing requirements of the business. He also influenced important personnel decisions in this direction, as for example in the case of the establishment of the firm's

¹¹⁵ See Glaser, *Erlebnisse*, 23–24, and also Reinhardt, *Forschung*, 77 ff, and Wiedemann, *Konstruktion*, II, 278–279.

¹¹⁶ Indications of this are in Glaser, *Erlebnisse*, 95, 104.

¹¹⁷ On the following, Glaser, *Erlebnisse*, is especially insightful. ¹¹⁸ Urkunden, vol. 1, 37.

¹¹⁹ See the calculation books by A. Clemm for the years 1863–73, 1867–78, 1879, and 1881, in BASF UA I 05/I/06; Glaser, *Erlebnisse*, 66.

¹²⁰ *Ibid.*, 24–25.

internal construction department or in the case of the expansion of the sales area.

In the person of August Clemm, Glaser saw “one of the pillars of the aniline factory, and the only man who would be able to implement reform” – this was the main reason that Glaser and Brunck supported the man, who was not especially likeable on a personal level. For his part, August Clemm also promoted their positions within the firm since he – with some justification – believed them to be decisive for the firm’s long-term performance. So it was that Brunck was named head of the common plants within the factory (the gas factory and the water works) after his return from Duisburg in 1876, instead of Carl Clemm.¹²¹ Brunck also took over responsibility, in part to relieve Glaser from some of his extensive remit, for industrial-scale production of the all-important alizarin blue within the alizarin department.

Glaser, for his part, headed up alizarin manufacturing from the very beginning, a fact that was fundamental to BASF’s business success in those years. Self-confident, he demanded full independence for himself and fought off the mixture of superior attitude and intrusion into his field of expertise that Carl Clemm attempted to carry out.¹²² When a boiler exploded and Carl Clemm tried to place the blame on Glaser (which had luckily caused no further harm), Glaser was able to demonstrate that the accident had been caused by insufficient quality to the sheet metal from which the boiler was constructed. What is more, he proved that Carl Clemm had been solely responsible for its purchase. This near catastrophe was used by Glaser “as a tool with which to try to attain an influential position within the managing board.” This tool was employed with some success: Supported by Gustav Siegle and August Clemm, Glaser and Brunck were named deputy directors with power of attorney on February 11, 1879.¹²³ Glaser took on additional responsibility for overall leadership of the promising area of azo dyes, which he had already worked on during his time as assistant to Kekulé.¹²⁴ Overall responsibility for the gas factory, the water works, workshops, and water wells was transferred from Carl Clemm to Brunck, who soon thereafter was also given the headship of the firefighting service within the plant.¹²⁵

Obviously, these steps did not solve the problems in the top management. Instead, they grew more difficult still in the years that followed, mainly owing to serious differences of opinion over the future of the firm. Unfavorable developments on the alizarin market precipitated these in the first instance.¹²⁶

¹²¹ Ibid., 95.

¹²² On this and the following, see *ibid.*, 106 ff; also see the letter of Glaser to the Direktion of November 5, 1876 in BASF UA, W 1 Glaser.

¹²³ AR, April 7, 1879, BASF UA, C 112. Contracts are in C 627/2.

¹²⁴ See Glaser, *Erlebnisse*, 116 ff.

¹²⁵ Rundschreiben, July 28 and September 2, 1879, BASF UA, A 19/1.

¹²⁶ On this and the following, Glaser, *Erlebnisse*, 125 ff; Schröter, Engelhorn, 181 ff.

On account of its great popularity (and correspondingly strong demand), alizarin had quickly become BASF's most important source of income and profits. But this very success brought about competition from other manufacturers, which resulted in substantial reductions in financial yields as prices fell dramatically.¹²⁷ The question thus presented itself of how to deal with the looming crisis of overproduction. Personal motives and expert considerations played an equally great role in the formation of opposing fronts within the managing board, which had already existed for some time. The entrepreneur-capitalist Engelhorn, always thinking about rapid financial success, and hoping for some sort of cooperative venture with the English competition, at first developed a variety of adventurous plans, including buying up all available stocks of anthracene, the starting material for the production of alizarin. He then even considered selling BASF to an English consortium, at a considerable profit of course – much to the disgust of the two younger members of the managing board. They countered that the factory that they had helped build should not “become an object of speculation for people on the stock exchange.”¹²⁸ Confident of further possible cost reductions and of the superiority of their own product, the two were the most important opponents of contractual agreements with competitors, a strategy advocated for some time by Engelhorn. They believed, in contrast, that BASF would be able to fend off even the strongest competition in the long term in this area.¹²⁹ In fact, the smaller alizarin producers were in the process of being forced to give up manufacture, and even Bayer was coming under greater and greater pressure.¹³⁰ As far as BASF was concerned, Gustav Siegle of course intervened successfully from his vantage point as an experienced businessman from Stuttgart in favor of an alizarin convention. He did so in part in order to work against a “terrible state of rampant bribery” and “an already generalized low moral character of the dyestuffs market.”¹³¹

This, though, did nothing to eliminate uneasiness and disagreements among the top management. Indeed, for the next three years, from the end of 1880 until the end of 1883, the supervisory board had to confront again and again a mixture of personal animosities and the requirements of an organization of which it was difficult to gain an overview. Their aim was to create a situation that would in future hinder friction and conflict at the institutional level as far as possible.¹³² August Clemm, an opponent of the alizarin convention (at least in the form in which it eventually was enacted), at first tried to attack the position of Gustav Siegle with the – in many respects sensible – goal of transferring sales to Ludwigshafen. However, in view of

¹²⁷ The price per kilogram was 270 marks in 1869; 40 marks in 1877; 23 marks in 1878; 17.50 marks in 1881; 9 marks in 1886; 8.30 marks in 1899; and 6.30 marks in 1902.

¹²⁸ Glaser, *Erlebnisse*, 141a. ¹²⁹ Ibid., 125 ff.

¹³⁰ Indications of this are in Flechtners, Duisberg, 58 ff. ¹³¹ Glaser, *Erlebnisse*, 127–128.

¹³² Minutes of the meetings of the AR, in BASF UA, C 112.

Siegle's indispensable commercial experience, Glaser and Brunck were not prepared to follow Clemm along this line. But even between the two "general directors" tensions grew: This was obvious even to those on the outside when Engelhorn and Siegle used their votes at the members' meetings of the alizarin convention "in a divergent way" and, for this reason, received stern warnings from the supervisory board.¹³³

An additional point of disagreement, which brought about new confrontations at the highest level, was of an even more fundamental nature, not least since it involved the future research and production strategy of the company.¹³⁴ Not accidentally, the conflict revolved around indigo, more precisely the synthesis of indigo: The attempt to substitute for a natural dyestuff by means of a laboratory product of equal quality, but more reasonably priced. Up until now, no other shade of blue had been able to compete effectively with indigo, and so, in the event of success, potential profits were correspondingly high. It was therefore a genuine sensation when at the beginning of 1880 Adolph Baeyer, at that time professor in Munich, let his friend Caro know that he had succeeded in the synthesis of indigo from nitrocinnamic acid. To be sure, the difficult task of finding a suitable method for industrial production still remained, but the long path toward the synthesis of indigo had thus begun.

Full at first of sanguine hopes for a rapid success in this innovation,¹³⁵ Engelhorn tried to push Caro toward his highest levels of performance. But when the first attempts failed, Engelhorn favored giving up. In January 1882, August Clemm, who had fallen out with Engelhorn and Siegle, had become increasingly alienated from the firm, and evidently had no great faith in its future, resigned.¹³⁶ In the normal course of events, he would have moved immediately into the supervisory board, but his adversaries Engelhorn and Carl Clemm withheld their votes, with the result that for several years afterwards he had no formal office in the firm. Glaser and Brunck, who maintained contact with him, contemplated resigning in sympathy, but were swayed by Siegle into staying. Convinced of the ultimate success of a long-term and systematic research strategy, they insisted on holding the course with regard to the synthesis of indigo, now that the company had started down this path. In this, they were supported by their friend, the youthful leader of the sales department, August Hanser (1851–95). But the attempts by the supervisory board to smooth over the fights and disagreements within the managing board were not successful. Glaser and Brunck now demanded that Engelhorn and Carl Clemm withdraw from the managing board, and were willing

¹³³ AR of October 24, 1882, BASF UA, C 112.

¹³⁴ On this and the following, see Glaser, *Erlebnisse*, 134 ff; Schröter, Engelhorn, 186 ff.

¹³⁵ See Glaser, Brunck, 19.

¹³⁶ AR-Minutes of the meetings 1881–82; Rundschreiben "im Januar 1882" in BASF UA, C 13; entry in Handelsregister, February 6, 1882, GLA 276/1302.

to put up with only Engelhorn¹³⁷ (and not Carl Clemm) in the supervisory board. Instead, they wished to bring August Clemm back into this body. As Engelhorn explained to Glaser at the end of 1883, what was at stake was “the future control of Ludwigshafen.”¹³⁸

It was the Stuttgart faction that ultimately determined the outcome of the conflict, since it was this group that was able to throw its considerable portfolio of stocks onto the scales. It did so under the leadership and direction of Gustav Siegle. And the decision fell clearly in favor of the younger high fliers, whose expertise it was virtually impossible to do without. Engelhorn and Carl Clemm must also have been aware of this, and they drew the consequences by announcing their resignations from the managing board without any further resistance whatsoever. The threatened withdrawal of Glaser and Brunck from their positions would have put the full burden of the future development of the company on the shoulders of the long-serving Ludwigshafen factory leaders, and this at an especially difficult time. Engelhorn was unwilling to take this risk, especially since he was somewhat pessimistic about the prospects of BASF, at least in the near term. Thus, it seemed more sensible to him to retreat to the lighter load presented by work in the supervisory board, which at the same time offered the possibility of control over the firm as well as a number of favorable conditions for him personally. These included the vice presidency, the chairmanship of the delegation, and a 1 percent stake in the net profits of the company. If, in the face of considerable doubts on the part of the Stuttgart faction, Glaser and Brunck were able to realize their wish that August Clemm was later brought into the supervisory board, this only underscored their strong position within the company. Beginning on January 1, 1884, they represented the real leadership in the new managing board, which also included Gustav Siegle as commercial director and Heinrich Caro (responsible for research and patent matters). August Hanser and three others from Stuttgart were promoted to deputy directors.¹³⁹

Siegle, of course, occupied the position of permanent chairman of the managing board. But Brunck, in his position as technical director with its wide remit, and especially owing to his virtually inexhaustible capacity for work, was generally acknowledged as the actual head of the company, including by his friend Glaser. Brunck combined scientific competence with personal charisma, thought in terms of wide-ranging temporal and factual interconnections, and from the beginning placed his bets on a long-term research strategy. His ability to pick out good people, and his gift for clever and

¹³⁷ According to the AR minutes of April 27, 1883, Engelhorn moved already at that time from the direction to the supervisory board, although in actuality this step was put off until January 1, 1884: AR from December 22, 1883.

¹³⁸ Glaser, *Erlebnisse*, 145.

¹³⁹ See Schröter, Engelhorn, 188–189; AR from December 28, 1883; entry in Handelsregister December 31, 1883, GLA 276/1302. Urkunden, vol. 2, 60.

considerate management, were of considerable use again and again in the selection of suitable employees and in successful promotion of their abilities. "His great commercial ability;" his "gift of divination" for promising approaches for development and for the technical realization and economic "usability of new research results;"¹⁴⁰ his calculated courage to take risks; his stubborn pursuit of objectives once they had been laid down; and his clear talent for organization all made him an important driving force within the firm.

With the end of the "Engelhorn era" and the beginning of the "Brunck era," a new spirit entered the company, one focusing on long-term research objectives and product planning. Brunck and Glaser were responsible for the aniline department, including azo dyes whereas Caro looked after the main laboratory and patent matters. It was especially advantageous, as it turned out, that Brunck, Glaser, and Hanser (the business manager in Ludwigshafen) enjoyed a close personal relationship. The departure of Engelhorn and Carl Clemm from the supervisory board of BASF in summer 1885 and the election of August Clemm to this body (1885–1903) ensured for at least the coming one and a half decades that the most important centers of the company were in some harmony with one another.

The next step undertaken at BASF of major organizational significance and under the influence of Brunck and Glaser was in the direction of raising efficiency through concentration. The division of working responsibility between Ludwigshafen (production and purchasing) and Stuttgart (mostly sales) was the result of a compromise between competing interests, which had formed the basis of the fusion of 1873 and from which all of those participating profited handsomely. The stated wish of one of the shareholders in 1874 and 1877 that the sales office should be moved to Ludwigshafen was met with little sympathy.¹⁴¹ The quality of the sales department led by Siegle was beyond question. On the other hand, the spatial separation made close cooperation with purchasing and production more difficult, and the same was true of contact between chemists and technicians on the one hand and consumers on the other: the problems and desires of customers could often stimulate productive work in the laboratory. This led again and again to serious discord between Ludwigshafen and Stuttgart.¹⁴²

It was thus only a matter of time before all of these activities would have to be brought together in Ludwigshafen, especially after Siegle himself indicated that he wished to withdraw from his managerial responsibilities in view of his activities in other firms and owing to his political commitments as a member of the Imperial Diet (*Reichstag*).¹⁴³ By autumn 1886 at the

¹⁴⁰ Glaser, Brunck, 30.

¹⁴¹ See AR from April 27 and 28, as well as October 24, 1877, BASF UA, C 112.

¹⁴² For a critical view of this, see Brunck, "Lebenserinnerungen," 6 ff.

¹⁴³ Report of Hanser from November 23, 1886, BASF UA, A 15/5.

latest, internal planning discussions were actively being pursued.¹⁴⁴ By spring 1887, the basic decision to centralize everything in Ludwigshafen had been made. After that date, the restructuring was prepared, and apparently proceeded without major incident despite occasional tensions in working with Siegle.¹⁴⁵ In fact, things were so well organized in the final stages of this preparation that salaried employees finished their work on the afternoon of Saturday, March 30, 1889, in Stuttgart, and resumed work in the newly built main building in Ludwigshafen on the following Monday. Most of the 106 salaried officials, along with most other personnel employed previously in Stuttgart, moved to the western side of Rhine. Simultaneously, Siegle and the other two remaining deputy directors from Stuttgart resigned from the BASF board of directors. Since Ludwigshafen expressly refused any continued production in Stuttgart,¹⁴⁶ Siegle arranged for the withdrawal of the plant for pigment dyes (mineral and paint dyes) from the factory in return for a payment of 2.5 million marks. What is more, in return for ceding responsibility for production of all remaining aniline dyes to Ludwigshafen, Siegle took over Ludwigshafen's chromium-oxide green production (permanent green, Victoria green). Subsequently, he went to expand and complete this by buying the Kast & Ehinger dye-printing plant in Feuerbach, near Stuttgart, which was further expanded in 1891 through a subsidiary in New York. But until his death in 1905, he, along with his friend Kilian Steiner (until 1903), remained in the supervisory board of BASF, and so the Stuttgart influence on Ludwigshafen lasted into the twentieth century.

The reorganization of 1889 confirmed the unchallenged leadership position of Heinrich Brunck, even though Caro, Glaser, and August Hanser took over directorships at the same time. Caro, "heart and soul the experimentalist,"¹⁴⁷ was feeling more and more uncomfortable in the post into which he had grown. He saw himself sinking against his will into a mere "company man," who was on the verge of drowning in a joyless sea of paperwork. He therefore viewed his abrupt resignation from BASF at the beginning of 1890¹⁴⁸ as a liberating return to his "true profession."¹⁴⁹

In order to continue to benefit from both Caro's expertise in patent matters and his gift for invention, however, BASF, following extensive negotiations, granted him appointment to the supervisory board and to its narrower central committee (and the rights to honoraria that went with that). The firm also awarded him a substantial basic yearly salary of 20,000 marks along with additional compensation as appropriate to the significance of his new

¹⁴⁴ AR, October 18, 1886.

¹⁴⁵ See though the criticism from Brunck and Hanser from January 4, 1888 in BASF UA, C 12 (Nachlaß Glaser), Konflikt 1883, Nr. 6.

¹⁴⁶ DelAR January 9, 1888, BASF UA, C 113. ¹⁴⁷ Bernthsen, 50 Jahre, 39.

¹⁴⁸ See AR from October 15, 1889.

¹⁴⁹ Caro to Baeyer, February 8, 1890; Wiedemann, Konstruktion, II, 278–9.

discoveries and their eventual industrial application.¹⁵⁰ Glaser, on the other hand, moved to the supervisory board in 1895.¹⁵¹ Since Hanser died in November of the same year, Brunck ran the day-to-day affairs of the company for the following eight years together with just three deputy directors who had been newly appointed in 1895: Sigmund Vischer as technical deputy director; and Adolf Kächelen and Robert Hüttenmüller as commercial deputy directors.¹⁵² The atmosphere within the company's managing board was held to be open and cooperative.¹⁵³ Even the relationship between the managing board and the supervisory board became relatively harmonious, especially since the former's remit was unchallenged. Yet, starting in 1897, tensions began to mount between Director Brunck and the new chairman of the supervisory board, August Clemm, although, admittedly, they came to a head only after the turn of the century.¹⁵⁴

The rapid growth of the firm not only caused organizational problems at the top, however. It also brought about new demands for control and regulation in the middle and lower levels of the company. And it was the requirements of the production process that had the earliest and deepest impact in this regard. The specific needs and methods involved in manufacturing an increasingly differentiated palette of products meant that the company perforce was subdivided into an increasing number of plants that operated largely autonomously from one another. The managers of the individual production plants – academically trained chemists who deployed the work force and controlled the manufacturing process together with skilled foremen – jealously fought for and guarded their full independence. What is more, this attitude had not just been promoted, but was actually demanded, by the institution itself. Indeed, Bernthsen, head of the research laboratory from 1887/89, reported that at the time he joined BASF the individual departments of the company “according to the strict orders in existence at that time were not permitted to deal with one another directly except through the managing board. Instead of collecting information and ideas from the individual plants within the company about the requirements of the business, I was directed to get the information and ideas through study of the patents of the competition.”¹⁵⁵ Such tendencies toward strict demarcations within the company threatened ever increasingly to be counterproductive. After all, they rendered much more difficult the transfer of scientific knowledge and technical know-how not just between the firm's chemists, but also

¹⁵⁰ See correspondence of the direction, 3 ff, especially also January 4 and 10, 1890; AR from November 20, 1889 and April 10, 1890.

¹⁵¹ See AAR from December 28, 1893 and April 10, 1895.

¹⁵² See *Direkte Korrespondenz der Direktion*, 107/108 (April 16, 1895, Brunck and Hanser to Knosp).

¹⁵³ L. Brunck, “Lebenserinnerungen,” 66–67.

¹⁵⁴ See the materials in BASF UA, C 12 (Nachlaß Glaser). More on this is in Part 2, section one.

¹⁵⁵ Bernthsen, 50 Jahre, 39.

between its technicians. Thus, for instance, in the construction of new apparatus, there were times when the same problem was being worked on in several different places within the firm without anyone being aware of this. What is more, different solutions were often found to the same problem. In the area of sales, too, organizational problems associated with adapting to the development of the firm began to appear. The separation of purchasing and sales, activities that had been going on for many years, had deleterious effects, which were intensified by the fact that business accounting systems were carried out at the departmental level according to internal rules. On this basis, of course, reliable calculation of costs was hardly possible. In this respect, it was only the establishment of the “little IG” in 1905 and imported know-how – especially from Leverkusen – that led to a more satisfactory state of affairs.

The Heart of the Company – Research and Production

It was BASF’s products that paved the way to the company’s position of international leadership in the lucrative coal-tar dyes market. Well into the twentieth century, the manufacture of “artificial” dyes determined the firm’s image. In the current day, having grown accustomed to dyes, it is difficult to imagine the high regard in which contemporaries held such products of the laboratory, their increasing variety, and their continuously expanding applications. What is more, the fact that the new and vast range of dyes, which began to appear in all areas of life, owed their existence to a large degree to systematic experimentation and a scientific basis was another source of fascination. The expectation that it would be possible in the foreseeable future not only to replace all previous “natural” dyes through better and more inexpensive products out of a test tube, but also to outdo nature by introducing new shades of color, was the expression not just of scientific euphoria, but also of commercial hopefulness.

In the beginning, however, genuine research performance was not typical at BASF or at its Mannheim-based predecessor firm. Instead, the imitation of processes developed elsewhere and, if absolutely necessary, the taking over of patents from other firms were the order of the day. The same was true for the other German coal-tar dye producers. Later, Caro over-, or perhaps understated, the situation when he claimed that it was “a joyless imitation industry that gained nothing” and that furthermore “handicapped the flight of discovery and invention on one’s own, which alone is beneficent.”¹⁵⁶ Nevertheless, it is important to bear in mind that even the relatively risk-free practices of the early days of the industry could not be undertaken without solid expertise and specialized knowledge. What is more, the rapid and

¹⁵⁶ Caro, Reden, 151.

potentially lucrative progress inherent in particular in organic chemistry provided an impetus for firms to take up their own research. The “scientization” of industry and the industrialization of science were thus two sides of the same coin. In Caro’s words, “individual performance, which had been the case earlier, was replaced by planned cooperation within teams, something that at times reached the level of scientific mass production. ‘Scientific laboratories’ are established in the factories; the supervision and improvement of the production facilities are transferred to academically trained chemists; and the restrictive influence of uneducated foremen and ‘old practitioners’ is set aside entirely.”¹⁵⁷ In short, the coal-tar dye industry developed into a model for what is now called “science-based industry.”

BASF recognized the possibilities inherent in such developments early on, and accordingly built up close and multifaceted cooperation with universities and polytechnics.¹⁵⁸ By hiring first Heinrich Caro (1868), and then Glaser and Brunck (1869), Engelhorn demonstrated a remarkable sense of the capabilities of these three men, whose subsequent work despite – and in part because of – their different character traits complemented one another well. The successes of Caro and his co-workers are incontestable. In addition to the aniline dyes, these extended in particular to the alizarin dyes and – in its very beginnings – to the exhausting efforts surrounding the synthesis of indigo. In the area of azo-dyes, too, BASF chemists made important contributions at first, although they eventually left this potentially lucrative field to the competition to a large extent. The generation of chemists that followed was not easily able to make up for the lag in this area. On the other hand, following 17 years of effort, they were ultimately successful in developing an industrial process for producing the “king of the dyestuffs,” indigo. Shortly after the turn of the century, René Bohn (1862–1922) opened the path to systematic development of the indanthrene dyestuffs field when he developed “Indanthron” (indanthrene blue). Additionally, a series of breakthroughs in the inorganic area contributed not only to the synthesis of indigo, but also helped in the move in the direction of synthesis of ammonia.

The following tour of the production facilities of the company begins therefore in the laboratory, the creative starting point for new product possibilities. We then proceed to the dyeing works as the decisive testing stations for the practical usefulness of the products of the laboratory. Thereafter, we pay a visit to several of the various manufacturing departments of the factory that had come into existence by the end of the nineteenth century. After all, progressive diversification of the product palette was both a cause and effect of specialized research, and led, in turn, to an increasingly differentiated factory organization. Thus, the company’s initial dye department was

¹⁵⁷ *Ibid.*, 165–166.

¹⁵⁸ See in general Borscheid, *Naturwissenschaft*, 111 ff, 135 ff; Marsch, *Wissenschaft*, especially 22 ff, 49 ff; on BASF in particular, see Schuster, *Wissenschaft*.

split in 1872 into the alizarin section and the aniline section. A specialist and independent azo dye department was hived out of the latter in 1896, and a separate indigo department was formed in 1897 under the directorship of Rudolf Knietsch. On practical grounds, relevant sections of inorganic production were then placed under the indigo department. But the lion's share of inorganic manufacturing remained in the “soda and acids” department.

Obviously, large-scale production requires not only laboratory know-how, but also suitable manufacturing spaces and effective technology that is appropriate to specialized needs. In the interest of flexibility and in part also on the basis of industrial secrecy, BASF thus created extensive departments for these areas. The construction and the machine-technical departments served chemical production in its narrower sense as necessary service facilities. The same is true for other factory facilities for supply of energy and for communication and transport technology.

Science as a Factor of Production – Laboratory Work

It was a salient characteristic of the “new” industries that their production was primarily led and driven forward by the newest scientific knowledge and discoveries. For the coal-tar dye industry, the chemical laboratory thus served as the indispensable link between research and industrial application. In developing this area, two paths were open to a company to secure as profitable a scientific yield as possible in the face of increasingly sharp competition. One possibility was close cooperation with university professors. Another was to hire chemists who had completed a solid university course of study to operate a laboratory for the firm. As the example of BASF indicates, the two possibilities could complement one another in many ways. Scientific cooperation with university institutes, arranged for the most part by Caro, showed itself in the early phase as the clearly more efficient path toward profitable innovations: In the exchange of opinions and experience between Adolf Baeyer and Caro, in fact, this form of cooperation took on an almost symbiotic character for a while.¹⁵⁹ Clearly, of course, this form was also burdened with the characteristic tension between the production and profit orientation of industry and academic basic research, which, with an eye on academic freedom, shied away from the golden fetters of commerce. This was certainly one of the main reasons it proved so difficult for BASF during the 1880s to convince well-known university lecturers to share their competence and knowledge with the firm. Thus, Engelhorn failed in 1883 when he offered to Baeyer and two of his best-known students, Emil Fischer and Victor Meyer, an opportunity to enter the service of BASF as advisers to the managing board by giving the firm first call on their discoveries and

¹⁵⁹ See Wiedenmann, *Konstruktion*; Reinhardt, *Forschung*, 77 ff, 102 ff; and Reinhardt, *Travis, Caro*, 179 ff.

inventions in exchange for a substantial honorarium. This was also the most likely reason why Engelhorn failed to realize his hopes of strengthening his own position within the company in the struggle for its leadership, a contest that had just broken out with a vengeance.

In contrast, Brunck began in 1884 the rapid and sustained expansion of firm-internal scientific competence. He saw this as the path allowing better control and direction in the effort not only to secure the leading position of the company in the dyestuffs market, but also to gain a foothold in new fields such as the production of pharmaceuticals. In this last respect, however, the efforts of the managing board to gain the long-term services of suitable university lecturers for research did not lead to any positive results,¹⁶⁰ and BASF consequently remained well behind Bayer and Hoechst. Despite relatively modest success with the fever-reducing product "Thallin" (1885–90),¹⁶¹ the Ludwigshafen-based concern therefore decided to abandon its efforts to expand its presence in the newly emerging pharmaceuticals market owing to uncertainty over its future development. It was thus all the more important that it shore up its leading position in the area of dyestuffs through scientific activity.

In this regard, Caro had from the start of his association with the firm established a basis that could be built upon. His laboratory, which was extraordinarily modest to begin with, soon developed into a well-endowed heart of scientific and economic progress within BASF. Indeed, it became known as the "main laboratory" beginning in the mid-1880s, in order to distinguish it from the laboratories of the various departments within the factory that had sprung up in the meantime.¹⁶² The stately building in which it was housed, completed in 1888 and right next to the building where the managing board had its offices, reinforced visually the well-deserved high regard in which it was held. It also enabled it to improve its performance in a sustained manner, something that was likely to have been an important reason for Hoechst and Bayer to follow hot on BASF's heels with the establishment of their own central laboratories.¹⁶³

Since Caro's energies were increasingly taken up by patent matters, and since the ingenious loner also seemed ill-suited for a full-fledged leadership function owing to his limited organizational abilities, one way out was to limit or subdivide the area for which he was responsible. In 1883/84, Caro himself hoped to lure Johann Peter Griess, the "father of the azo-dyes" (Caro), back to Germany from England as an employee responsible for the

¹⁶⁰ Reinhardt, *Forschung*, 146 ff.

¹⁶¹ GB 1885, BASF UA, C 22 and P 8404; Reinhardt, *Alizarinblau*.

¹⁶² On the development of the industrial laboratory in particular at BASF and Hoechst, see in particular Reinhardt, *Forschung*, and Reinhardt, Travis, *Caro*, 219 ff.

¹⁶³ Hoechst opened its central laboratory in 1889. On Bayer, where Duisberg pushed through its establishment, Duisberg, "Lebenserinnerungen," 68 ff.

laboratory area. This attempt, which must be seen against the background of the conflicts within management that were going on at the time, failed, however, owing to Griess's apprehensions about the situation.¹⁶⁴ Similarly unsuccessful was Siegle's attempt in 1884 to engage Professor Emil Fischer (who had previously been approached by Engelhorn when he was a student of Baeyer, being a major presence in organic chemistry even in his early years)¹⁶⁵ as head of research in Ludwigshafen. Negotiations with a number of other university chemists in the following years had similar outcomes.¹⁶⁶

It was not until 1887 that a reasonable and long-term solution was found: Caro remained the director of the main laboratory, but concentrated to an ever-increasing extent on work that was linked to patent questions (Patent Laboratory). The direction of the scientific-chemical section of the main laboratory, in contrast, was taken over by a former assistant of Kekulé, by now professor at Heidelberg, Heinrich August Bernthsen (1855–1931). This appointment followed Bernthsen's long and close cooperation with Caro, during which time, among other things, Bernthsen came up with a better method for synthesizing the unusually successful methylene blue that Caro had initially discovered.¹⁶⁷ Beginning in 1889, Bernthsen took up full leadership in the main laboratory as Caro's successor. Paul Julius (1862–1931), who had joined BASF shortly after Bernthsen in 1888, became his closest associate, his deputy, and after 1897 his successor, at least for research work in the area of azo-dyes.¹⁶⁸ Through systematic examination of the patented production processes of the competition, the main laboratory performed a scientific service function to the firm in patent questions, especially those related to patent protection. It was for good reason, then, that Bernthsen took over the leadership of patent matters in 1897 after he had already provided expert advice for some time to the lawyers hitherto responsible for it. The main laboratory also had an important function as the starting point for the growing number of newly engaged young academics, since it was here that they were prepared for their task as industrial chemists in the various departments of the company.¹⁶⁹ Attached to the main laboratory were the

¹⁶⁴ See Hofmann, Griess, 1055–1056; Schuster, *Wissenschaft*, 93–94; copies of the letters from Griess to Caro from March 31 and April 10, 1883 are in BASF UA, X 21.

¹⁶⁵ Reinhardt, *Forschung*, 125 ff.

¹⁶⁶ Schuster, *Wissenschaft*, 98–106; Reinhardt, *Forschung*, 128, 151–152; Vaupel, Graebe, 362. Vorstandssitzung of January 14, 1884 (attempts to gain the services of Otto Fischer), BASF UA, C 12.

¹⁶⁷ Bernthsen, 50 Jahre, 30, 35 ff; Reinhardt, *Forschung*, 131 ff; Reinhardt, Travis, *Caro*, 214 ff.

¹⁶⁸ Bernthsen, 50 Jahre, 40, 42; Meyer and Blangéy, Julius; NDB 10 (1974), 658 (H. Pfitzner); Reinhardt, *Forschung*, 153–154, 158, 183–184. BASF UA, W 1 Paul Julius. On several other attempts of BASF to secure the services of university chemists in 1898–99, see Borscheid, *Naturwissenschaften*, 202.

¹⁶⁹ Bernthsen, 50 Jahre, 49–51.

analytical investigative laboratory, which had been established in 1888, and a technical laboratory, or “*Technikum*,” which carried out experiments on a small technical scale.¹⁷⁰

In addition to the main lab, increasingly intensive research activity took place beginning in the early 1880s in the laboratories of the individual departments of the corporation, this with a view to supporting their specialized needs and technical requirements. The new work was performed in addition to the continuous testing of materials and control of production that had previously been carried out in the departments. For example, the aniline laboratory under Conrad Schraube (from 1882) did research on chemical intermediates and aniline and azo-dyes.¹⁷¹ Under René Bohn (from 1884), the alizarin laboratory, modernized in 1895, became the birthplace of indanthrene dyestuffs. Important research was also conducted in the acids laboratory as early as 1883. It was here that initial efforts on indigo synthesis took place until a dedicated laboratory was established to support the newly founded indigo department. In the inorganic department, under the leadership of Rudolf Knietsch, who incorporated the qualities of a chemist and an engineer, the specialized plant laboratory did not just do path-breaking research for indigo synthesis, but also in other areas.¹⁷² Like the main laboratory, the labs of the individual departments and divisions were supported by a technical laboratory in the practical realization of new processes.¹⁷³

In the everyday life of research practice, BASF, like other firms operating to a high scientific level, frequently resorted to the tried and true methods of imitation. For one thing, the patents of the competition were studied. What is more, the chemical structures and properties of relevant products that had just appeared on the market were analyzed. Attempts were made, if market forecasts indicated that it would be worth the investment, to find a previously unknown way of making them, or, at the very least, to gain ideas for further research programs. The German patent law of 1877 encouraged this sort of behavior in general since it protected only the chemical production process, not the chemical product itself. It was thus a good precondition for enlivening competition in the area of research.

The Stony Path to the Marketplace – Dyeing Works as Testing Stations

The value of newly discovered dyestuffs had to be proven on actual materials. This was especially true for the dyeing of wool, cotton, and silk. But it applied increasingly also to leather and paper; feathers and straw; liquids, soaps, wax, and fats; artificial silk and leather; and linoleum and wax cloth. Dyes were also used in printing on textiles and paper (wallpaper), and

¹⁷⁰ Reinhardt, *Forschung*, 155. ¹⁷¹ Ibid., 228 ff. ¹⁷² Ibid., 240. ¹⁷³ Ibid., 319–320.

applied to wood, stone, and metal. In fact, only a modest fraction of newly discovered laboratory products withstood testing by the “colorists.” Despite being important not just on its own very considerable merits, but also because of its positive impact upon research, their work was central to BASF from the very beginning. As the palette of dyestuffs and shades of color grew to such an extent that it was no longer possible to get an overview, and when competition between suppliers sharpened, this work finally came to be fully appreciated. The personnel were duly professionalized. Here, too, chemists took over the direction of things in conjunction with “technicians.”

Experimental dyeing works, which were almost unimaginably basic at the beginning, were the first testing stations for new manufactures and soon developed into the decisive link between the products of the laboratory and applications-oriented technology. At BASF, though, the separation between production and sales that accompanied the fusion with the two Stuttgart-based firms hindered things considerably in this regard. The control dyeing works was based in Stuttgart, since it was from there, after all, that customers were supplied and looked after. In contrast, Ludwigshafen at first had only a modest facility of this kind in the aniline department, headed up by a former apothecary. In 1881, a control dyeing works was added to the alizarin department.¹⁷⁴

When the fusion with Stuttgart came to an end, the specialist dyeing works at Ludwigshafen were expanded in order to test not only BASF’s own products, but also those of the competition, mainly in order to get ideas for further development and research. The key position within the factory was occupied, however, by the technical dyeing works, which was established in 1891 and controlled sub-departments that included the large-scale and small-scale dyeing works, the paper and leather dyeing works, the analytic dyeing works, the aniline dyeing works, the experimental dyeing works, a printing plant, and a paint laboratory. Starting in 1897, the indigo dyeing works was added.¹⁷⁵ The imposing new building that the technical dyeing works moved into in 1895 demonstrated already at this relatively early date the growing size and increasing significance of this field, which included research activity on the application of dyestuffs and was soon granted a considerable number of patents.¹⁷⁶ What is more, it acted as an important link between chemists and salesmen¹⁷⁷ by schooling the future “travelers” and supporting the marketing of products through the provision of customer information, including specialist courses offered to dyers.

¹⁷⁴ Glaser, *Erlebnisse*, 88–89; Reinhardt, *Forschung*, 98.

¹⁷⁵ BASF UA, Q 1, Manuscript O. Zohlen; VT, *Entwicklung des Färbereiweises*, 9.

¹⁷⁶ BASF UA, Q 001: H. Kuckertz, *Geschichte der Aweta [Anwendungstechnische Abteilung]*, 1896–1961 (unpublished manuscript). See Reinhardt, *Forschung*, 241.

¹⁷⁷ L. Brunck, “Lebenserinnerungen,” 30–31.

“The Age of Dyestuffs” I: Aniline Dyes

The new world of dyes unfolded itself in a continuous and interactive process of discovery, testing, production, and marketing. The role of production in this process was by no means limited to the dyes themselves, but rather comprised not only inorganic starting materials but also numerous organic starting materials and intermediates (e.g., aniline and anthracene),¹⁷⁸ all of which were necessary for the manufacture of the spectacular range of dyestuffs. It was for this reason that Caro characterized the intermediate plant as the “heart of the production facilities.”¹⁷⁹

The interest of the broader public was concentrated naturally, however, on the end products of the manufacturing process. If in the following overview of the various dye departments the most important dye creations along with their inventors and/or discoverers are briefly introduced, this is with the intention to go beyond mere provision of a list. The idea is rather to convey their significance on the consumer market in relation not only to that of their competitors, but also compared to natural dyes, with which the coal-tar dyes had begun a true struggle for survival. It was in this way that an increasingly more finely differentiated palette of dyestuffs came into existence with ever-wider applications. Without the most elementary information on these products, it would be difficult to understand the spectacular rise of BASF to a position as world market leader.

Under the banner of “aniline dyestuffs,” the “aniline department” incorporated production of a number of goods that, using categories developed later, were actually in very different dye groups.¹⁸⁰ The manufacture of di- and triphenylmethane dyes – the first being fuchsin or red aniline – remained one of BASF’s main areas of production, and the employees associated with it made crucial contributions to the further development of this dyestuffs group and to the improvement of manufacturing processes. In 1875, Caro together with Baeyer in Strasbourg discovered nitrosodimethyl aniline, and on this basis developed methylene blue, which BASF registered on December 15, 1877, thus taking out the first German patent on a coal-tar dye.¹⁸¹

¹⁷⁸ See in this regard the manuscript produced in a number of different versions by A. Palm between 1975 and 1978 on organic intermediates at BASF in BASF UA, H o H 01/1-H 01/3. Further material is in BASF UA I 7001/7005.

¹⁷⁹ Caro, Entwicklung, 1016.

¹⁸⁰ A compilation of the 85 most important dyestuffs that “were discovered or first produced under factory conditions and brought onto the marketplace” within BASF is located in: *Weltausstellung, 70–75*. The following information was compiled from various BASF brochures and manuscripts located in the BASF archives (especially VT I, 251 ff, as well as VT, Trifarben). Publications on dyestuff chemistry were also useful, such as Schultz and Julius, *Übersicht*, and Georgievics, *Handbuch*. See also recent scholarly literature, in particular Reinhardt, *Forschung*, and Reinhardt, Travis, *Caro*.

¹⁸¹ Urkunden, vol. 2, 50; Reinhardt, *Forschung*, 84–85, 108–109.

Owing to its advantageous color characteristics and its lightfastness, methylene blue became a long-term success, and it was especially popular in cotton dyeing works and printing plants. Once Paul Ehrlich had discovered its anti-neuritic effects and its ability to combat the effects of malaria in 1891, Hoechst even put it on the market as a medicine. Moreover, methylene blue was used (and is still used) to dye bacteria for examination under microscopes, and it demonstrated its usefulness in this respect by enabling Robert Koch's discovery of the tuberculosis bacillus. The patent for methylene blue was closely followed in 1877 by Caro's patent for acid fuchsin (fuchsin S). This dye proved to be completely resistant to acids and could thus be mixed with natural dyes. This possibility facilitated the production of intermediate shades that had never been seen before. The product's primary application was in the dyeing of wool. Finally, in 1879, Friedrich Köhler added light-green S to the dyestuffs palette with the help of the same sulfuration methods that Caro had applied in making fuchsin S.

The production of dyestuffs from the phthalein group was also carried out within the aniline department. This group consists of organic compounds that are among the triphenylmethane derivatives. The starting point was Baeyer's discovery¹⁸² of selenium fluoride. It was on the basis of this relatively unimportant dyestuff that Caro, using bromination, developed "Eosin" in 1874, a brilliant pink that evoked a sunrise (in Greek, *Eos*). It was only later, however, that it became apparent "how much the quality and quantity of this 'Eosin' would be able to be developed for the manufacture of dyestuffs."¹⁸³ It represented the widely heralded first step along the way into "the rich and colorful area of the resorcin (1,3-benzenediol) dyes."¹⁸⁴ "Eosin," which, depending on production process, could yield a broad palette of nuances between yellowish and bluish, was of particular importance in the dyeing of silk and wool, and to a lesser extent, paper. But it also came into play in the manufacture of dyes for paints: relatively benign in terms of health risks, it was able to challenge toxic lead-based dyes in certain market segments. The basic counterpart to the acidic Eosin dyes, the first rhodamine,¹⁸⁵ was discovered in 1887 by Maurice Cérésole in the BASF main laboratory. A series of further rhodamines followed in the next few years. Pink shades of particular brilliance and intensity, they were, on the other hand, somewhat limited in their color-fastness.

BASF's entry into the production of phosgene dyestuffs¹⁸⁶ followed an unusual path. In 1883, Alfred Kern, the plant manager of the aniline facility of Bindschedler & Busch in Basle (later Ciba),¹⁸⁷ had developed an

¹⁸² Reinhardt, Travis, *Caro*, 181 ff. ¹⁸³ Glaser, *Erlebnisse*, 78.

¹⁸⁴ Weltausstellung, 78.

¹⁸⁵ Reinhardt, *Forschung*, 163 ff. ¹⁸⁶ See Reinhardt, Travis, *Caro*, 208 ff.

¹⁸⁷ Not long afterwards, Kern founded together with Sandoz the later Sandoz works in Basle. See NDB 11 (1977), 517–518 (H. R. Schmid).

important process for the manufacture of aniline dyes on the basis of phosgene. The firm, however, considered it too risky to develop this process to industrial scale on its own. In order to secure supply of the required starting materials at favorable prices and also to gain the aid of a strong partner in developing technology- and patenting-related processes, it therefore offered to do this in conjunction with BASF. The result was a contract signed on May 11, 1883. It regulated patents, awarded a 10 percent share for the Swiss-based firm of the relevant profits at BASF, and set the level of prices of the starting materials to be delivered from Ludwigshafen. This guaranteed the necessary scientific know-how that enabled Caro and Kern to develop efficient production methods within a short time. On this basis, it proved possible not only to synthesize dye shades that were already known (such as the popular Malachite green) of better quality than had previously been the case; it also laid the basis for the discovery and development of a new class of dyes, the ketonimides. Within this class, the auramines – inexpensive yellow, orange-red, and brown dyes for the dyeing and printing of cotton, wool, silk, paper, and leather – were the most spectacular products. Already in 1883, Kern had paved the way for the development of this new area after he successfully manufactured highly sought-after gold-yellow auramine, and Caro contributed by improving the synthesis process.¹⁸⁸ The auramines thereafter posed a serious competitive threat to the yellow natural dyes such as buckthorn, turmeric, and quercitron. Other valuable dye shades followed, including crystal violet, ethyl violet, Victoria blue, and night blue. All of these were developed by Caro and Kern in 1883 already. Several acid violets and alkaline violets were developed between 1884 and 1891 by Carl L. Müller.¹⁸⁹

Another group of dyestuffs was the indulines, the first representative of which had been developed by Caro already in 1863. With the addition of acetin blue in 1886 and azo-carmine in 1888 by Conrad Schraube, the group gained two dyes that proved of some value both in cotton calico printing and as a substitute for the expensive Orseille in the dyeing of wool. Among the other important products of the aniline department in the dyeing of cotton were Nile blue (developed by Thomas Reissig, 1888), and induline scarlet and flavinduline (both by Schraube, in 1892 and 1893, respectively). Rheonine, a yellow dye of the so-called akridine type, was developed by Carl L. Müller in 1895 and was used in particular in leather dyeing.

“The Age of Dyestuffs” II: Azo-dyes

Until 1896, the aniline department was also home of the production of azo-dyes, which soon became the largest group of coal-tar dyes by far. The

¹⁸⁸ Vaupel, Graebe, 217–218. ¹⁸⁹ NDB 18 (1997), 438–439 (L. Meinzer).

“variety of their colors and the simplicity of their manufacture at nearly theoretical yields” as well as their relatively high degree of colorfastness brought the companies high profits. At the same time “the ease with which they can be fixed to fibers increased consumption enormously.”¹⁹⁰ An additional advantage of the azo-dyestuffs resided in the fact that they had proven themselves “as suitable for the dyeing of all known fibers.”¹⁹¹ There were still further advantages, too: low production costs; the possibility of making mixed shades; and, not incidentally, the possibility of combining azo-dyes with metal bases to make dyes for paint, which helped drive out the old and expensive pigment dyes.

All in all, the chemists of BASF made substantial research contributions in this area, in spite of the fact that they were in danger of following behind the competition in the 1880s owing both to their primary orientation toward the extremely hard-wearing alizarin dyes and to their renewed commitment to indigo synthesis. Building on the discoveries and investigations of diazo compounds by Johan Peter Griess (1829–88) in the years after 1858, Caro, in cooperation with Martius, had already in 1863/64 brought Manchester (or Martius) yellow and Vesuvin (Manchester, or Bismarck brown) into industrial production. By 1867, both dyes began to feature in BASF’s range of dyes. The actual era of the azo-dyes did not begin, however, until the mid-1870s. In 1876, Caro, who at that time was in close contact with Peter Griess,¹⁹² created chrysoidine, at the same time as Otto Nikolaus Witt. Chrysoidine¹⁹³ was a gold-orange colored dye that was suitable for wool, cotton, and silk. In 1877, Koehler followed with genuine yellow. What is more, by 1878/79, the firm began to produce orange-colored acidic dyestuffs that were not protected by patents. The Orangés, as they were known, were a discovery of the French apothecary François Zacharie Roussin. As “successful challengers to natural dyestuffs” and “major breakthroughs in their technical effect” (Caro), they attracted considerable attention and admiration, feelings that were intensified through the ease with which they could be used for dyeing wool and silk and owing to their fiery shades of color.¹⁹⁴

Much more significant for BASF, however, was a creation by Caro from 1877, genuine red A, the first red azo-dyestuff, which was followed by a series of further true red shades and true brown in 1878. Thanks to its particular suitability for the dyeing of wool, the dye soon began to drive out the competition, Orseille, which had hitherto occupied a practically unchallenged position in dyeing wool red. The new synthetic also competed successfully against the beautiful, but also extremely expensive, carmine, the product of the cocheneal scale insect. Orseille and carmine had incidentally

¹⁹⁰ Meyer, vol. 2 (1893), 279. ¹⁹¹ Weltausstellung, 44.

¹⁹² On the connections between Peter Griess and BASF (and in particular Caro): Schuster, Wissenschaft, 75–94; see also Caro, Griess, XVII–XVIII, XXVI ff.

¹⁹³ Reinhardt, Travis, *Caro*, 166 ff.

¹⁹⁴ See Caro, Griess, XXI–XXII; Reinhardt, Forschung, 91; Reinhardt, Travis, *Caro*, 170.

at one time been the most valuable products manufactured by the Knosp firm. In 1880, a still clearer Ponceau red was added to this list, the production of which (along with the additional Ponceau dyes that were based upon this) BASF took up under license from Hoechst. Finally, several different yellow shades completed the dyestuffs palette. In 1879, for instance, Caro discovered naphthol yellow S, a dye that was suitable for both wool and silk. Owing to its favorable coloring characteristics and low price, it found a good market.¹⁹⁵ Similar qualities were demonstrated by the quinoline yellow (Jacobsson), which was discovered in 1882 and had a greenish-yellow tint, whereas tartrazine, which entered the product range in 1885,¹⁹⁶ stood out owing to the beauty and wash-fastness that it demonstrated in dyeing wool and silk yellow. From this point onward, therefore, the yellow natural dyestuffs were faced with severe competition on a broad front.

In 1877, Caro succeeded in conjunction with Conrad Schraube, a student of Baeyer, in the further development of the intensely colored disazo-dyes. As a result, BASF was able to bring a whole series of such products onto the market in the next few years, including among others the brownish-violet Orseille red (Julius Schuncke) in 1881 and, in 1882, blue-black (Glaser, Schuncke), which was based on the former and especially important. This first black azo-dye broke the near monopoly that log-wood, or campeachy wood, had hitherto enjoyed on the German and international marketplace, and it consequently began to make inroads into the market of yet another vegetable dye, although in this case the natural product was for some time clearly superior to its synthetic competitor. BASF, however, decided against applying for a patent to protect this particular discovery in order to not have to reveal the complicated manufacturing process for it, especially since the firm viewed the process's further development as especially promising. But in so doing, the company only succeeded in doing damage to itself, since the firm of Leopold Cassella & Co. obtained a patent in 1885 for a similar manufacturing solution.¹⁹⁷ As a result, BASF was only able to make use of its rights based on previous usage of the process rather than those that a patent would have secured.

A further instance of neglect by BASF chemists was commercially even more painful, even if understandable from a technical perspective. Already in 1882, Peter Griess informed Caro about his discovery of a dyestuff that, in contrast to those azo-dyes known to that point, could be fixed to cotton simply and directly, that is, without undergoing a steeping process (involving metal oxides). It also featured high yields and was light-fast, although it reacted with high sensitivity to the influence of acids.¹⁹⁸ Ludwigshafen,

¹⁹⁵ Bernthsen, 50 Jahre, 38; Reinhardt, Travis, *Caro*, 175.

¹⁹⁶ The person who discovered it was T.H. Ziegler from the Gesellschaft für chemische Industrie in Basle.

¹⁹⁷ Reinhardt, *Forschung*, 97. ¹⁹⁸ Schuster, *Wissenschaft*, 91–92.

however, passed up the chance to assume a pioneer role in the field of the substantive dyes, mostly owing to the fact that the company had higher expectations about the fastness of the product than Griess's newest discovery seemed able to fulfill. A short time later, moreover, the corporate leadership of BASF passed up a second major chance in this area. In 1883/84, Paul Böttlinger, a former Bayer employee, developed Congo red a radiant substantive disazo-dye on the basis of previous discoveries by Griess.¹⁹⁹ Böttlinger initially offered his discovery to Bayer, and subsequently to BASF and Hoechst. But he had no success since the firms viewed the dyestuff as unusable owing to its sensitivity to acids. It was not until the Aktiengesellschaft für Anilinfabrikation (Agfa) in Berlin decided to take a chance on the patent that a surprising degree of success followed.²⁰⁰ After all, in the years after 1884, Congo red and the other Congo dyestuffs (benzopurpurines) that built upon it experienced a remarkable sales boom, especially in exports to the Far East, owing to their simple application to cheap cotton goods. This occurred at the expense of alizarin red dyeing processes. The substantive cotton dyestuffs thus quickly developed into a genuine object of desire, and so Congo red became the true starting point of modern azo-dyestuffs chemistry²⁰¹ with its "scientific mass production" (Caro) thanks to the wide range of possible compounds within the azo-group (-N=N-). What is more, the group could extend to new color groups if the dye molecule contains several azo-groups, as for example in the case of the dis- and trisazo-dyes.

With much more hesitation than Bayer, which was acting under pressure from the forward-looking young Carl Duisberg, but then finally with some success, Ludwigshafen began to work more intensively in this field. This was especially true after Bernthsen took over the leadership of the main laboratory and Paul Julius became first his closest associate and soon his scientific successor. Next to Julius, Conrad Schraube and C.L. Müller were most active as creators of marketable products. In the course of a decade, BASF was therefore able to patent a respectable number of azo dyes that, thanks to their quality, found a good market.²⁰² Furthermore, by means of systematic research in the area of starting and intermediate products, BASF was able to make up for lost ground. Beginning in 1893, the company brought out the oxamin dyes for cotton (Bernthsen and Julius) and began entering production of highly sought after Congo red and a number of other

¹⁹⁹ See Travis, *Caro*, 271 ff. ²⁰⁰ Flechtner, *Duisberg*, 69–70.

²⁰¹ Reinhardt, Travis, *Caro*, 172.

²⁰² These included brilliant black in 1886, which was important for the dyeing of wool as a replacement for logwood; violet-black in 1887 (Schraube); cotton yellow G and salmon red in 1888 (C.L. Müller); Karbazolgelb in 1889 (R. Bohn), which was especially useful in wool dyeing; Naphthylblau in 1890 (Schraube); Indoïnblau in 1891 (Julius), which was significant as a competitor for indigo in the dyeing of cotton; cotton orange in 1893 as well as, in 1894, thiazin red and brown (C.L. Müller); wool violet in 1894 (Julius); Palatine black in 1897 (C. Bülow). See Bernthsen, *50 Jahre*, 39 ff; VT I, 259 ff.

benzopurpurines, especially when its chemists (Suckow) succeeded in 1895 in developing a new competitive manufacturing process for them.²⁰³ Already in 1893/94, nitrosamine red came onto the market. An ice dye (C. Schraube and C. Schmidt), it constituted a strong and therefore long-lasting and inexpensive shade of color with significance for dyeing of cotton and printing of calico²⁰⁴ and consequently presented competition for alizarin red. By 1897, the missing building block in the series of substantive dyestuffs, cotton black, was discovered by Julius. At the end of the century, there followed the chrome dyes (Palatine chrome dyestuffs), which were particularly colorfast.²⁰⁵ Palatine chrome brown and Palatine chrome black, for instance, were both discovered by Julius, each of which posed a competitive threat to campeachy wood in the dyeing of wool. At about the same time, Paul Julius developed lithol red R,²⁰⁶ an azo-dye that, in contrast to most synthetic dyes, was also suitable as a paint dye. This discovery, in fact, proved to be the starting point for the systematic development of organic pigments, one of the most lucrative markets for BASF and one that was captured at the cost of the pigment dyes that had previously been typical in the trade.²⁰⁷

“The Age of Dyestuffs” III: Alizarin Dyes

Until about the end of the nineteenth century, alizarin (or anthraquinone or anthracene) dyestuffs formed a major focus of BASF’s production. But it was only after they demonstrated their durability in combination with a highly nuanced color range and varied applications (extending to lacquer dyes) that coal-tar dyes finally got on the road to long-term success in competition with previously known natural dyestuffs.

In this field, BASF played a pioneering role. Graebe, Liebermann, and Caro provided the most crucial preconditions for the industrial manufacture of alizarin red, the first synthetically produced natural dyestuff. However, according to the testimony of Glaser, he and his colleagues (Sigmund Vischer and Heinrich Appenzeller) required six more years of “agonizing work” before they overcame all of the technical difficulties associated with industrial production and could match or surpass any competitor on the market in terms of quality, variety, and price.²⁰⁸ In 1872, an independent alizarin department under the leadership of Glaser was established. The three varieties of red alizarin available by the end of that year (alizarin, anthrapurpurine, flavopurpurine) were followed by the multicolored alizarins from the mid-1870s. These included alizarin orange in 1876 (by Caro on the basis of continuation of work that had started elsewhere);²⁰⁹ and alizarin violet (Gallein) and alizarin green (Coerulein) in 1878, both of which were creations of

²⁰³ Reinhardt, *Forschung*, 172–173.

²⁰⁴ Georgievics, *Handbuch*, 100–101.

²⁰⁵ Hoffmann, *Azofarbstoffe*, 73–74.

²⁰⁶ Urkunden, vol. 2, 75.

²⁰⁷ Reinhardt, *Forschung*, 175–176.

²⁰⁸ See *ibid.*, 97 ff. ²⁰⁹ *Ibid.*, 83–84.

Baeyer.²¹⁰ The most important of them all, however, was alizarin blue, a discovery that attracted considerable attention and that Glaser made on the basis of the observations of the colorist Prud'homme from Mühlhausen in Alsace concerning the further processing of alizarin orange. Because of the purity of its color shade, alizarin blue entered into competition with the “king of the dyestuffs,” indigo. This was especially true after Brunck, in the course of developing an industrial process for its manufacture, found a way to overcome the difficulties associated with its solubility, thus making it suitable first for the true dyeing of cotton and then wool (1881, alizarin blue S).²¹¹ The fact that it proved possible to fix alizarin dyes to various textile types besides cotton expanded their applications considerably over the long term. As a result, BASF was able to enter new market segments (such as military textiles) with some success.²¹² Of particular economic importance in this connection was the further development of alizarin red for the colorfast and true dyeing of wool (1884, alizarin red S).

From the moment he entered the alizarin department in 1884, René Bohn brought a new spirit to research there.²¹³ A student of Professor Heumann in Zurich, he soon proved himself to be one of the most productive members of the BASF laboratory staff next to Caro and Knietsch. Already in 1885, he discovered aminopurpurine (alizarin marron) for the production of brownish shades of dyes. This was followed a year later by anthracene brown (important for calico printing and the dyeing of wool) and galloflavin (a greenish-yellow mordant dyestuff for wool and cotton). In 1887, he discovered naphthazarin, and in 1889 alizarin yellow A. Naphthazarin in its various guises of alizarin black permitted unusually good and long-lasting applications of black and gray colors to wool. As alizarin black S it was also used in calico printing and, owing to its inexpensive manufacture, placed even relatively cheap competing vegetable-based products (campeachy wood) under considerable pressure. In 1888, Bohn succeeded in using alizarin blue in a particular reaction process²¹⁴ to develop a whole series of new, but also beautiful and superbly fast shades of dye, the so-called chrome mordant dyes. These came onto the market beginning in 1890. Alizarin blue-green, green, and indigo blue started the ball rolling, and they were followed by blue mordant dyes for wool (anthracene blue dyes, 1891–6),²¹⁵ and by further mordant dyes (alizarin dark-green and resoflavin by O. Bally in 1898). In 1893, Bohn moved into a new class of dyestuffs with the discovery of “true black.” The so-called sulfur dyes, which were in a manner of speaking

²¹⁰ In Schultz and Julius, *Übersicht*, Nr. 366–367, 1870 and 1871 are given as the respective years of discovery.

²¹¹ Glaser, *Erlebnisse*, 104 ff; Reinhardt, *Forschung*, 100–101. ²¹² Glaser, Brunck, 16–17.

²¹³ Julius and Kunz, Bohn; Reinhardt, *Forschung*, 213 ff; on the cooperation with Graebe, see Vaupel, Graebe, 296 ff, and materials in BASF UA, W 1.

²¹⁴ This is the Bohn-Schmidt reaction. See Hoffmann, Alizarin, 22. ²¹⁵ Ibid., 23.

rediscovered by Vidal in France, were especially suitable for dyeing cotton. Thanks to relatively high wash and lightfastness and low production costs, especially in the ever-difficult area of shades of black, this group had good chances for high profits and so became a favorite area of production for virtually all dyestuffs factories.²¹⁶ BASF chemists, with Bohn at the forefront, intensively researched the sulfur dyes beginning in the late 1890s (after 1898, the cryogenic dyes), but only attained the market success they hoped for after the turn of the new century.²¹⁷

Despite this, however, BASF found itself in a continuous research competition with Bayer especially in the area of alizarin dyes. Moreover, there was also considerable competition from the side of Hoechst, which proved an optimal precondition for numerous patent suits until the parties to the disputes set aside their differences in 1900 by signing a second alizarin convention, dividing up and fixing their respective market shares. The fact that Ludwigshafen was awarded the largest share (somewhat more than one-third) demonstrated its leading position in this field. Indeed, one year later, in 1901, Bohn opened a new and lucrative field of production with a blue vat dye for cotton, which “considerably exceeded [indigo] in terms of its beauty and brightness, but also in its wash and light fastness.”²¹⁸ The era of the indanthrene dyes had begun.

“The Age of Dyestuffs” IV: Indigo

BASF achieved one of the most significant breakthroughs in the development of new products when it succeeded, following difficult and expensive efforts, in the manufacture of “artificial” indigo.²¹⁹ After Baeyer had made indigo in the laboratory for the first time in 1880 and entered into contracts with BASF and Hoechst with regard to industrial production of the dye, the quest for a suitable manufacturing process held the company in suspense for 18 long years. To be sure, it was well known that the victor in the competition to develop such a process could expect profits that exceeded anything previously seen by a wide margin. Every year at that time, 5,000 tons of pure indigo was used, with a sales value of 80–90 million marks,²²⁰ in other words approximately double the sum that the madder business was worth in its time. Indeed, Germany alone imported about 21 million marks worth of

²¹⁶ See Georgievics, *Handbuch*, 437 ff. ²¹⁷ Reinhardt, *Forschung*, 176 ff.

²¹⁸ Duisberg, *Abhandlungen*, 295.

²¹⁹ On the development of indigo synthesis at BASF, see H. Brunck, *Entwicklungsgeschichte*; the relatively brief but good overview in von Nagel, Fuchsin, 30 ff. See also especially Wiedemann, *Konstruktion*, and, finally, Reinhardt, Travis, *Caro*, 186 ff. Materials are also available in BASF UA I 1101.

²²⁰ This is approximately the average estimated value given in various contemporary sources.

indigo in both 1895 and 1896.²²¹ Indigo was cultivated extensively, especially in India, the most important of the English colonies, but also in Java, Central America, and Egypt. Such was the proven demand, that the firm that succeeded in making the breakthrough in its synthesis could reckon with global expansion of its sales that not only exceeded the volume of indigo available naturally but also extended to other products. The fact that it would not be a simple task to achieve this was clear owing to the outset, if only from the complicated process of dyeing itself. At the outset, insoluble indigo had to be processed through reduction into soluble, but colorless, indigo white. Originally, this happened in vats in which indigo was transformed chemically through fermentation, which is why the process was known as “vatting.” It was only when cloth was first submerged in the vat and then dried that the blue shade appeared on the fiber through oxidation. Owing to strong fluctuations in color content and impurities, it was therefore difficult to predict the quality of the final goods, and so even greater rewards could be expected from a synthetic product with standardized characteristics and simple application procedures.

Adolf Baeyer had occupied himself with the chemical structure of indigo starting in 1865.²²² Following a long break, he then took up his work again at the end of 1876, not least owing to the influence of Heinrich Caro, and, on January 22, 1880, he was able to write to Ludwigshafen with the news that he had found a suitable method for the production of indigo. The contract that BASF thereupon concluded with Baeyer in order to deploy his patent, dated March 16, 1880,²²³ provides evidence of the high regard in which the discovery was held: Baeyer was paid 100,000 marks and was to receive a share of 20 percent of the net profits of the manufacture of indigo. What is more, if his share did not reach a half million marks by the beginning of 1887, BASF had the right to satisfy all of the inventor’s rights through payment of this amount. Otherwise, Baeyer’s share was to continue to exist, with a maximum payout of one million marks.

It is nevertheless worth noting that Engelhorn, at Baeyer’s express wish, took the Hoechst Farbwerke on board when establishing the first indigo convention so that BASF and Hoechst could set off together in search of a technically profitable manufacturing process. In this way, the potentially most difficult competitor was turned into a compatriot. In the event of a joint success, they would be able quite simply to divide the massive market between the two firms. Neither of them ran the risk of going away empty-handed if the competitor reached the final goal first. The contracts of the patent confederation anticipated a situation in which each of the two firms would be able to use relevant discoveries and patents and would each have an equal share of the market until June 30, 1897. The USA and France, together

²²¹ The data for 1872–1903 are in Lauterbach, *Geschichte*, 106.

²²² See Baeyer, *Werke* 1, XXXVIII ff, 179 ff. ²²³ Urkunden, vol. 2, 53.

with all of its colonies, would be reserved solely for BASF unless Hoechst could find a manufacturing process of its own that was not dependent on the methods that Baeyer had developed.²²⁴

As far as Ludwigshafen was concerned, Caro concentrated all the forces of the main laboratory and of two Baeyer's assistants on the development of indigo synthesis. Baeyer was given overall leadership in this work,²²⁵ although it soon became obvious that the process he had developed (special hopes were placed on ortho-nitrocinnamic acid) could not be deployed on a large technical scale. An inexpensive synthesis of the highly sought-after material, it was clear, would require a long-term scientific and financial commitment. For a while, BASF pinned hopes of a rapid breakthrough on the fact that Caro succeeded already in the summer of 1880 on building directly on Baeyer's discoveries by using nitrophenyl propionic acid to fix indigo directly onto the fibers. This method, known as "little indigo," was restricted, however, to printing on cotton. What is more, on account of the extraordinarily unpleasant odor associated with it, it was not favored in the least and thus remained, despite the high quality of the final results, unprofitable.²²⁶ As it turned out, even when Baeyer fully decoded the structure of indigo in 1883, a useful path to the industrial deployment of his discoveries remained to be found. In the same year, moreover, clearly influenced by the reshuffling of BASF's leadership, the cooperation with Baeyer and his assistants in the laboratory was put on ice. Further attempts to build upon Baeyer's discoveries ended up in dead-ends: the necessary starting materials were too expensive, and the yield was too small. What is more, a process for the manufacture of chlorine indigo, acquired from the firm of Bindschedler, Busch & Co. from Basle and installed and headed up in Ludwigshafen by Rudolf Knietsch,²²⁷ similarly failed to bring about the hoped-for breakthrough.

It was not until new work on the synthesis of indigo was done by Karl Heumann in Zurich, and the patents based on it were acquired by BASF and Hoechst in 1890 and 1893,²²⁸ that the chemists charged with this development at BASF (namely Rudolf Knietsch, Eugen Sapper, and Paul Seidel) came up with new and fruitful approaches to the problem. They found themselves able to reach the desired objective using relatively inexpensive starting materials, although in the course of this development work they continued to

²²⁴ Reinhardt, *Forschung*, 116. The contracts between BASF and Hoechst from June 16, 1880 and July 14/18, 1882 were designated as being "in the sense of a sales and research cartel."

A copy of the contract of July 14/18, 1882 is in *Urkunden*, vol. 2, 58. The contents of the contract are described in an 1890 outline available in BASF UA I 11/10.

²²⁵ Reinhardt, *Forschung*, 118 ff.

²²⁶ Schuster, *Wissenschaft*, 64 ff; Wiedenmann, *Konstruktion*, I, 49 ff; Reinhardt, *Travis, Caro*, 191 ff.

²²⁷ Wolf, *Knietsch*, 117.

²²⁸ Copies of the contracts are in *Urkunden*, vol. 2, 64; BASF UA, E 2/10/2 and I 1101, vol. 2, I 11/9.

pursue unsuitable solutions for a number of years.²²⁹ Starting in 1893, however, the ultimate success of the project began to take on clear contours since key components of the future production process were now beginning to become available. One of them was the sulfuric acid contact process that had just been brought to technical maturity by Rudolf Knietsch. With the aid of this, as Eugen Sapper discovered in 1891/92, it was possible to realize the oxidation of naphthalene on an economic basis and thus to manufacture large quantities of phthalic acid at low costs. This then enabled the production of antranilic acid, one of the essential materials for the synthesis of indigo. What is more, chlorine-alkali electrolysis, a critical step in the field of electrochemistry, secured inexpensive mass production of chlorine, which could then be further processed into chloracetic acid, a further material needed for synthesis of indigo.

Thanks to these preconditions and well-used chance discoveries (most importantly, the discovery of mercury as a catalyst), it was possible in spring 1894 to begin the first, modest manufacture of indigo using the new process. However, it took three more years of hard and innovative work for the chemists, engineers, and technicians before it was finally possible to scale this up to full industrial production. In February 1897, the plants began operation, and starting in July of the same year, “pure indigo from BASF” came onto the market. It was marveled at and admired, although it also came under suspicion and, in part, was also defamed by the competition. Allegations circulated that it was not produced synthetically and, more importantly, was not the equal of the natural product. For this reason, the Prussian and French military authorities initially refused to allow it to be used for dyeing the cloth for their uniforms.²³⁰

All of this, however, did little to slow down the spectacular success of the new creation. By means of an intensive sales strategy,²³¹ BASF was quickly able to convince its customers throughout the world that the standardization of the dye content simplified and shortened the complicated process of vatting and dyeing. This was especially true since the firm succeeded in delivering the product in forms that allowed its use in the methods used for dyeing outside of Europe (indigo S).²³² Consequently, Brunck was able after some short hesitation, and on the basis of the positive experience, to set production targets at very high levels, which required of course correspondingly large amounts of capital to be deployed, which was raised via emissions of shares and, even more frequently, through issuing of obligations.²³³ In the

²²⁹ On research on indigo at BASF beginning in 1890, with reference to older literature on the subject, see Reinhardt, *Forschung*, 196 ff.

²³⁰ See Part 2, section 1. ²³¹ Reinhardt, *Forschung*, 196 ff. ²³² *Ibid.*, 211.

²³³ On the internal deliberations and planning, see AAR 1897 ff, especially May 7 and October 15, 1897, October 18, 1898, January 19, October 17, and November 10, 1899, in BASF UA, C 113.

1899 business year, indigo earned enough to pay for the amortization and dividends on the capital that had been used to fund its development, all this despite the fact that production was not yet as extensive as had been planned.²³⁴

Nevertheless, the synthesis of indigo did not turn out to be the key to riches that had been dreamed about at Ludwigshafen since some important developments in the next few years damped expectations for profits. For one thing, a patent acquired from an outside source enabled Farbwerke Hoechst, BASF's rival, to discover an even more efficient way to synthesize indigo. Hoechst now pursued an extremely aggressive sales strategy in order to gain a larger market share.²³⁵ BASF thus enjoyed only a few years in which it could exploit its hard-won and expensively bought position as a monopolist. The second factor was that the Cassella firm in particular was able to draw away potential customers for indigo with its new and inexpensive blue sulfur dyes (in particular hydron-blue in the cotton trade).²³⁶ Lastly, BASF created its own unexpected competition in the medium term when in 1901 René Bohn discovered in indanthrene blue a shade of blue that was especially beautiful and longer-lasting than indigo, at least for cotton and linen. The combination of these factors explains the rapid fall in prices for synthetic indigo.²³⁷ In order to act against this development and to dampen down the tough competition,²³⁸ but also to secure its own position in anticipation of the merger with Bayer and Agfa, BASF fixed production and price levels in a 1904 agreement with Hoechst, in a manner that was quite typical of the period.

The question is, though: Did the high level of expenditure incurred by BASF in the development of indigo synthesis pay off? Brunck himself later claimed that the investment for the plant required for indigo production alone amounted to about 18 million marks. This was not far short of the nominal value of the total share capital of the corporation, which had been increased to 21 million marks by the end of the nineteenth century. It also corresponded to over a fifth of the company's total profits for the years 1880–97. What is more, substantial additional outlays came on top of this in the next few years, to say nothing of the expenditures for human resources. It is, however, virtually impossible to arrive at a reliable total reckoning of the costs and benefits of indigo synthesis. The positive interactions between the individual sub-fields of production and the know-how and discoveries that occurred on the basis of this were far too close – in fact, today they might

²³⁴ Brunck in AAR November 10, 1899, BASF UA, C 113. ²³⁵ Bäumler, *Jahrhundert*, 23 ff.

²³⁶ Hoffmann, "Indigo," 131–2.

²³⁷ In 1897 the price of a kilogram of indigo (20 percent paste) was 3.40 marks, but by 1904 was just 1.80 marks. BASF UA, I 1202, I 12/5.

²³⁸ According to L. Brunck, "Lebenserinnerungen," 55 ff, BASF in its competitive struggle with Hoechst went through "perhaps the most difficult" time "since it had come into existence."

be called “spin-off effects.” What is more, the sums that came into the firm’s coffers from sales of indigo were very high indeed. Turnover for BASF in the first eight years following indigo’s entry into the market (until the formation of the “little IG” at the end of 1904) amounted to more than 74 million marks.

A Promising Future as a Supplier to the Industry: Inorganic Production

In order to rid the firm of its burdensome dependence on suppliers, Engelhorn had steadily pursued at least one clear objective from the outset: “to produce on our own insofar as at all possible” all required raw and semi-finished materials needed for coal-tar dye production.²³⁹ It was here more than in many other areas that the company’s forward-looking concept lay. The fact that inorganic production served in the first instance the company’s own supply needs determined the development of the “soda and acids” department. Initially, this department appeared only in the guise of a subordinate service unit for the more spectacular dye departments. But already before the turn of the nineteenth to the twentieth century, thanks to a series of inventions and discoveries, it took on a more substantial role of its own that should not be underestimated. What is more, by permitting flexible adaptation to general market developments, it also made an important – if relatively modest – contribution to the firm’s turnover. Caustic soda, for instance, necessary for the production of dyes and supplied by BASF in especially good quality, became a highly sought-after product starting in the 1880s. It also served in economic terms to a large degree as a substitute for one manufactured good that still exists in the company’s name – soda. In actual fact, BASF shut down its soda manufacturing operations in 1884 when the new production process developed in the late 1870s by the Belgian Ernest Solvay began to drive out the relatively more expensive Leblanc process, which BASF had used.²⁴⁰ The rapid victory of the Solvay process ushered in a revolution in the inorganic chemical industry. In view of the rapid fall in prices, BASF purchased its soda beginning in 1884 from factories that specialized in its production, but also continued to use a part of the Leblanc process in the manufacture of sodium sulfate and hydrochloric acid, both of which sold well.

At the same time, the large amounts of hydrochloric acid that came out of this process were for a time very difficult to sell off. This, in turn, provided an impetus to use the excess quantities of the by-product to manufacture chlorine, which was in heavy demand and also required for a number of production processes. What is more, the output came in a form that permitted

²³⁹ Geschäftsbericht 1877, BASF UA, C 22. ²⁴⁰ See Osterroth, Soda, 107 ff.

its efficient and convenient deployment: It was the great accomplishment of Rudolf Knietsch (1854–1906) to develop an effective process for liquefying chlorine gas, which he did in 1888.²⁴¹ Furthermore, in 1895, BASF purchased a license from the Griesheim-Elektron chemical factory for the promising electrolysis process, which allowed manufacture of chlorine from sodium chloride (table salt). This was known as chlorine-alkali electrolysis,²⁴² and BASF was the first firm to take up large-scale production using it beginning in 1897/99, mostly to provide an essential material for indigo synthesis at relatively low cost.

It was, however, also the fundamentally new method for manufacture of sulfuric acid, developed to technical maturity by 1890 by Knietsch (and later perfected – as registered in a patent of 1898) on the basis of a process devised by Clemens Winkler, that proved to be a critical step on the difficult path to the “great indigo.” With the aid of the so-called contact process,²⁴³ it became possible to produce sulfuric acid – “the basis not only for the large-scale inorganic industry,” but also of great significance for “organic dye chemistry”²⁴⁴ – considerably more cheaply and in better quality from roaster gases than had previously been the case with the Gay-Lussac lead chamber process. The contact process was “really the first of all of the chemical-technical catalytic processes.”²⁴⁵ And it “became the basis for other large-scale industrial processes that employ heterogeneous gas catalysis and thus paved the way for the large-scale chemical industry,” that ultimately resulted in processes such as ammonia and methanol synthesis and coal liquefaction.²⁴⁶ BASF now sold sulfuric acid, which the firm had previously purchased from firms in Prague, Mannheim, Aachen, Kreuznach, and Frankfurt (Griesheim) as late as the 1880s.²⁴⁷ By 1894, the Ludwigshafen firm was manufacturing anhydride and – in a new plant established in 1895 – growing quantities of oleum (fuming sulfuric acid). Indeed, to supply Bayer in Leverkusen, BASF even acquired its own acid tanker and eventually sold Bayer a license to use the process.²⁴⁸ Acid products in fact came to dominate growing sales turnover in the inorganic area in the years that followed.

As a consequence, BASF’s major stake in the “Duisburger Kupferhütte” corporation became all the more valuable to it.²⁴⁹ In 1876, in addition to

²⁴¹ Glaser, Brunck, 22–23; von Nagel, Fuchsin, 35 ff; Wolf, Knietsch, 117–118.

²⁴² See Osterroth, Soda, 119 ff.

²⁴³ See Knietsch, “Schwefelsäure”; Wolf, “Knietsch,” 118 ff; von Nagel, Fuchsin, 37 ff; König, Massenproduktion, 383–4. The process, protected “as a secret” by the firm, was actually stolen by two of the company’s own tradesmen in 1897. AAR, October 15, 1897, BASF UA, C 113; VT, Anorganische Produktion, 46–7. The patent of June 3, 1898 is in Urkunden, vol. 2, 72.

²⁴⁴ Knietsch, Schwefelsäure, 4069. ²⁴⁵ Von Nagel, Fuchsin, 42. ²⁴⁶ Wolf, Knietsch, 114.

²⁴⁷ VT, Anorganische Produktion, 36 b. ²⁴⁸ Flechtnar, Duisberg, 152.

²⁴⁹ Some aspects of the history of this firm are in von Hommeyer, Hundert Jahre, while further materials are available in BASF UA, A 19/39 (statutes starting in 1895), A 19/43 (among

BASF, nine other manufacturers of sulfuric acid on the Lower and Upper Rhine came together to form this corporation, which was a joint purchasing venture for Spanish pyrites (sulfur gravel), which contained copper. The idea was to decrease costs, and thus to enhance their position on the market compared to their English competitors, by further processing and eventually selling the by-products of the manufacturing process. These by-products included copper, iron oxide, lead, silver, gold, thallium, selenium, and bismuth. The corporation, in which the sulfuric acid producers participated financially according to the amounts that they themselves processed, leased a factory that had been established on the Lower Rhine by Gustav Siegle in 1868 for the production of chromium green, vermillion, and aniline dyes. Duisburger Kupferhütte purchased the facilities and grounds 10 years later. Already in 1877, BASF posted profits from its holdings in the new company. As a result of increasing usage of the material produced in the Ludwigshafen factory – in 1900, this amounted to around 80,000 tons of pyrites – thanks to its heavy deployment of the sulfuric acid contact process, BASF's share in the Kupferhütte increased from an initial stake of 194,000 marks to 1.28 million marks in 1900. It thus went up from 29 to 43 percent of the total capital of the corporation. As the most important member of the joint venture by far, Ludwigshafen exerted a correspondingly large influence on the business policies of the company.

Structural Development, Technical Service Facilities

The Construction Department

The increasingly differentiated palette of products manufactured by BASF necessitated the permanent expansion of production facilities.²⁵⁰ The number of buildings, which had already reached 102 by 1872, went up to 220 by 1888, and to 421 by 1900. The built-up area of the factory grounds increased from over 2 hectares in 1866 to just under 7 hectares in 1875, but then jumped to more than 16 hectares in 1889 and nearly 32 hectares by 1900. But at the same time the firm also steadily increased its real estate holdings, from 32 hectares in 1875 to 206 hectares in 1900. It thus maintained a high degree of room for maneuver not only for the expansion of production facilities, but also for workers' housing in the Hemshof and (starting in 1899) the Limburgerhof. Consequently, the firm was able to add new buildings to the existing stock according to the modular construction principle without running into large spatial bottlenecks. However, the method used

other things, letters from Brunck from 1876, who clearly played an important role in the formation of the company). Other materials are available in the corporate reports and minutes of the supervisory board and of the Ausschuss des Aufsichtsrats.

²⁵⁰ The following is based on internal data from various collections in BASF UA, as well as the material presented in VT and in the BASF brochure of 1900, 4–5.

initially – deploying a team of its own tradesmen but primarily relying on two Ludwigshafen construction firms, all without any professional overall supervision within the factory – no longer appeared practicable in view of its rapid expansion. So, at the suggestion of August Clemm, the engineer Paul Eugen Haueisen (1845–1925), who hailed from Württemberg, entered the service of BASF at the end of 1874 in order to take up this task.²⁵¹ Haueisen first assumed the role of head of the newly created construction office, which also had responsibility for all of the firm's workshops, and subsequently headed up the construction department (including the water, gas, and electricity works). The “brick general” (as he was known among the workers, both respectfully and jokingly) exercised strict control over the everyday construction that was undertaken by Ludwigshafen-based construction firms. Through his designs and planning, he placed a major stamp on the structural development of BASF for the following four decades. This was true for the usage of the industrial space and for the industrial buildings themselves, which were built to a large extent with standardized components and sober, thrifty functionality. But it was also true for prestigious buildings such as the *Feierabendhaus* leisure building, which was meant for the loyal workforce of the factory, and the aesthetically lackluster workers’ housing in the Hemshof.

When it came to the factory buildings, what counted above all else was practicality. Although they exceeded the average standard of the initial years of the firm’s existence and now for the most part had basements, their systematically one-story construction remained astonishingly simple for a long period of time.²⁵² This was, of course, also an expression of the fact that production methods themselves often featured an almost craft-based character. It was only beginning in the 1890s and, to a greater degree, after the turn of the century that the influence of the rapid development of technical innovations led to a detectable change. The tendency toward concentration on expertise and the growing requirements of new technologies necessitated larger, taller, lighter, and stronger buildings that were differentiated from one another through their respective functions. Space-saving multistory buildings with flexible usage for the increasingly complicated, and in many cases continuous, production processes began to enter the factory grounds.

The Trades and Crafts Department

The factory buildings shaped the image of the company on the outside, but the efficiency of the work done within them depended heavily on the equipment for specific productive purposes that was housed there. Since there were

²⁵¹ See the extremely positive characterization in Glaser, *Erlebnisse*, 80. The following is based in particular on VT, *Grundlagen*, 55 ff, 74 ff, as well as Mach, *Entwerfen und Bauen*, 18 ff.

²⁵² See the depiction in VT I, 283.

no tried and true prototypes for this, the new coal-tar dye industry entered largely unknown terrain in this regard. It had to develop new apparatus and plants, which the companies then had to make – or commission – from the most diverse materials, for the most part one at a time, by special order. Although in the early phase machines and apparatus were primarily made and installed by outside firms, the effort devoted to the maintenance and repair of them grew significantly with the growth in the size of the firm. Consequently, in the interest of maximizing flexibility, cost savings, and – not incidentally – industrial secrecy, it seemed sensible for the company to undertake its own construction work. As a result, engineers, technicians, and tradesmen were brought on board, and extensive workshops were set up in the factory.²⁵³ Forges, metalworking shops, cooperages, and carpenters' workshops were all included in the factory's initial equipment. The growth of the individual trade areas was determined by the areas of development within the firm itself. For instance, the metalworking workshop, or rather the can soldering plant that was attached to it, eventually took over completely the manufacture of sheet-metal packaging for the shipment of the dyes and chemicals produced in the factory. The woodworking workshops not only produced the required amount of wooden packaging, but also were heavily deployed in construction work, particularly the bricklayers and whitewashers. By 1883, "the forge," which had developed beginning in the mid-1870s, had become the rapidly expanding machine-technical department. In addition to repairs and ongoing inspection of the factory, it was deployed increasingly in new construction, as for instance in the case of the facilities for production of sulfuric acid by the contact process, for chlorine liquefaction, and for the manufacture of indigo.²⁵⁴ Indeed, the construction and installation of sulfuric acid plants, which operated using a license for the new contact process, became a profitable business for BASF.

*Energy Supply*²⁵⁵

From the outset, chemical production has required considerable amounts of energy. One can get an idea of the rapid growth in demand by considering the quantities of coal and gas that were used. Demand for coal, for instance, grew from 27,800 tons in 1873 to 302,600 tons in 1900, in other words by nearly 11 times. Even more impressive was the increase in gas consumption of about 47 times during the same period (from 0.4 to 18.9 million cubic meters). Both energy sources were deployed above all else in firing more and ever larger boilers and steam engines – the performance levels of steam engines increased from 241 to 12,160 horsepower between 1872 and 1900. But they were also used for pumping gigantic quantities of water (1.2 million

²⁵³ Material on this is in BASF UA, R 701; Mach, Entwerfen und Bauen, 31 ff.

²⁵⁴ See materials in BASF UA, A 9/3.

²⁵⁵ See in particular Fees, Energiebetriebe, and also the materials in BASF UA, R 201.

cubic meters in 1873 but nearly 24 million by 1900); for lighting and heating; and for cooling, including the manufacture of artificial ice through new Linde refrigeration technology in the company's own ice factory. The latter gradually came to be used on a very large scale, in particular in manufacture of azo-dyes, and by 1900 ice consumption at the factory was 12,000 tons per year. It was for this reason that, already in 1883, the first gas works had to be replaced with a new gas factory with greater capacity, a facility that then had to be upgraded and expanded just three years later. Despite this, the firm had to draw additional gas from the city of Ludwigshafen between 1893 and 1901 until the construction of a larger second gas factory made it possible to attain self-sufficiency again.

Understandably enough, BASF was one of the earliest users of the new form of energy, electricity. At the beginning of December 1882, the firm was the first participant in the newly created Ludwigshafen telephone network. In fact, the firm had the first telephone connection in Bavaria as a whole and thus established the possibility of oral contact with Mannheim.²⁵⁶ A telephone exchange was set up in 1885 within the firm, and it was continuously expanded, reaching 150 connections by 1900.²⁵⁷ Starting in 1901, a centralized electric clock allowed for optimal timekeeping for the factory as a whole. Heavy current technology (direct current) came into the work in 1887 with the erection of an electricity center and a dynamo with a rating of 15 horsepower. This was meant to provide power for several arc lamps at the factory entrances and on the loading ramps on the banks of the Rhine as well as for a rapidly growing number of "light bulbs" (around 9,000 in all by 1900). New and larger central electricity works – in 1889, 60 KW; in 1894, 900 KW; and in 1896, 1,275 KW – satisfied demand, which was growing strongly with the increasing use of electric motors (by 1900, at least 130 were in use). But it was chlorine electrolysis, beginning in 1897, that pushed this into new dimensions, with total consumption reaching 9.5 million kilowatt hours by 1900. In 1894, an underground cable network began to be laid, replacing the previous overhead cables, and, beginning in 1889, an electrotechnical section within the construction department took over responsibility for all of the tasks associated with the electrical system. At the beginning, in 1894, there were 30 skilled workers employed in this area. This grew to 119 by 1900.²⁵⁸

Transport

Finally, the central administration formed a general department, that brought together the areas of payroll, warehouse direction, customs business, haulage, and, not least, transport.²⁵⁹ Transport, with the transshipping hall at

²⁵⁶ Müller, Fernsprechteilnehmer, 36–7; Feudel, Jubiläum des Telefons, 10–11.

²⁵⁷ Ibid., 38. ²⁵⁸ Krummeck, Werdegang, and Seubert, BASF-Netzspannungen.

²⁵⁹ BASF UA, A 9/3; VT, Grundlagen, Verkehrswesen.

its center, naturally had great importance for the smooth progress of work within the factory, especially since it had to guarantee swift and problem-free movement of growing volumes of goods to and from the factory ground, mainly by ship and rail. In 1900, it was reckoned, the throughput (the total volume of goods entering and leaving the works) may well have reached 500,000 tons or more. This necessitated the expansion of the quay facilities on the Rhine using pontoons, which were also equipped with high-performance machines such as steam cranes (used for the first time in 1888, but by 1900 five were in use by the firm). In addition, the rail network within the factory had to be continually expanded and upgraded. In fact, in 1872, there were just about 3 kilometers of track; by 1888, 17; and by 1900, nearly 46 (with 252 turntables). This growth necessitated the acquisition of a considerable stock of rail cars, amounting in 1899 to 387 in all. Yet, when Carl Duisberg visited BASF for the first time in 1893, what struck him in comparison to the Elberfeld works of Bayer was, in addition to the cleanliness of the yards, “above all the limited amount of transport” that was visible within the works.²⁶⁰ Given the volume of goods being moved about within the factory, this speaks well for the successful organization of transport, at least for this time.

The importance of all of these service facilities for the firm as a whole is evident in the proportion of employees working there. At the beginning of 1900, nearly 42 percent of the workforce was employed there, of which nearly four-fifths were in the construction and machine-technical department.

The Ecological Costs of Production – Environmental Problems?

The long-established scholarly opinion of political economists that water and air constituted “free goods” lost its validity as industrialization increased. It was perfectly obvious to contemporaries around 1860 that the chemical industry – through smoke, steam, wastewater, and questionable residues – represented a burden for its environment, both close to the production plants and well beyond them.²⁶¹ Concerns focused in the first instance on the hazardous off gases emitted in the course of soda production using the Leblanc process. But the manufacture of the new aniline dyes soon came under criticism also, mainly owing to the use of highly toxic arsenic acid in the production of fuchsin. Unsupervised depositing of these toxic substances in the earth or channeling of it into the rivers threatened dire consequences, something that came into the public eye in 1864 with publicity surrounding arsenic poisoning through the wastewater of a Basle-based coal-tar dye factory.²⁶²

²⁶⁰ Flechtner, Duisberg, 129–130.

²⁶¹ See especially Andersen, *Technikfolgenabschätzung*, 240 ff; Henneking, *Chemische Industrie*, especially 59 ff.

²⁶² See Travis, *Groundwater*.

However, although the center of environmental critique of the time centered on precisely those products that gave the corporation its name (aniline and soda), BASF had from the very beginning worked with the city, local government, and the county government in Speyer to minimize problems for itself.²⁶³ It was clearly a plus point in this regard that the site chosen for the plant (initially) was quite far away from large settlements, which tended to defuse the problem of complaints about water and air pollution. Complaints of those owning neighboring properties were also dealt with by the firm through the offer of a generous purchase price for the land in question. But the company benefited above all from the city of Ludwigshafen's pronounced interest in attracting and keeping industrial settlements and from the Bavarian authorities' fundamental openness to industry. It was for this reason that the possible risks of chemical production barely received a mention in the process of granting permission to build and operate plants. Indeed, insofar as the relevant expert reports addressed the problems at all, they tended to play them down. This was true in particular for the reports authored by the responsible county physician, Dr. Karl Knaps,²⁶⁴ who, beginning in late 1866, started to work part-time at the BASF plant as the first factory doctor in the whole of the chemical industry in exchange for a yearly salary of 350 guilders. The observations of an official commission (which included Knaps) that visited the factory in June 1867 were, however, somewhat more critical. The commission members complained at least about the unprofessional storage of arsenic residues, although they had no qualms about the practice of pouring acidic chlorine-manganese solution into the Rhine. Indeed, they claimed that this waste-disposal process would render it harmless much more satisfactorily than if it were collected into cesspools, since the solution would be very rapidly diluted.²⁶⁵ Such an assessment was, however, completely in line with the scientific belief of the period, which emphasized the self-renewing power of rivers, and had the effect that the wastewater problem was reduced in the near term mostly to technical problems. After all, the fluid, which was gathered in open channels, had to be directed with the aid of sluice that had been built for this purpose in the direction of the Rhine embankment. From there, it had to be directed into a solid, stone-lined channel, which was covered with boards and protected from unauthorized intruders by a perimeter, from which the wastewater ultimately ran into the Rhine.²⁶⁶ Additional drainage systems were added as necessary. But even

²⁶³ See Andersen, *Technikfogenabschätzung*, 246 ff.

²⁶⁴ His expert report of May 5, 1865 on the application for a concession by BASF is in Werk.

²⁶⁵ Expert report of June 26, 1868, and Bericht des Bezirksamtes Speyer from January 11, 1868, SALU Abt. 2330, BASF I, 153 ff and 116 ff, as well as 192; BASF UA, A 11/2/2, Urkunden, vol. 1, 34.

²⁶⁶ This is detailed in the concession of June 13, 1867, BASF UA, A 13/1/6. See also the documents in SALU, Abt. 2330, BASF I, 168 ff.

in the case of solid wastes, there do not appear to have been any major or insuperable difficulties with disposal. The firm used low-lying parts of its terrain to deposit the waste products of the production process (soda sludge) together with coal cinders, and the ground was then back-filled to the same level as the Rhine embankment.²⁶⁷ Neither did the perennial complaints of those located near the factory about noise and dust levels ever lead to any restrictions on production.²⁶⁸

Nevertheless, the need for a minimal level of environmental protection, especially with regard to the issue of arsenic, contributed to the modernization of the relevant production processes. The successful search for a process to manufacture highly sought-after fuchsin using nitrobenzene, and without arsenic, alleviated the problem in 1868 in a particularly inexpensive way.²⁶⁹ BASF, moreover, could then afford to heavily dilute the wastewater that contained arsenic from other processes (such as from the production of sulfuric acid) and drain it into the Rhine, and the factory inspectorate accepted this procedure with the explanation that it was impossible to detect any negative influences on stocks of fish.²⁷⁰ The threat of water pollution, however, remained a hot topic in the decades that followed, and caused major waves of concern from time to time, although admittedly without serious consequences for production at BASF. In fact, the volume of the firm's discharge into the Rhine and the contamination of the river that resulted from it increased considerably with the progressive expansion of production. Between 1892 and 1902 alone, this went up by nearly three times, from about 300 to 870 liters per second. Thus, a band of color that was 12–15 meters wide was formed. In 1892, it already stretched over 6 kilometers down river. By 1902, it was “possible to follow it through traces in the current on the left-hand side even further down river nearly as far as Worms.”²⁷¹ Even more importantly, however, owing to the acid content of the wastewater, serious damage was done to flora and fauna along the waterways, as was ascertained for the first time through hydrobiological analyses carried out shortly after the turn of the century. Even now, however, those responsible for it made no efforts at preventative cleansing of the wastewater before it was discharged into the river, and the responsible state authorities did not require this either.²⁷² The political sphere did not yet take on the chemical industry and its strategy of appeasement (as, for instance, in the formation of the “river committee”

²⁶⁷ Bericht des Bezirksamtes Speyer, January 11, 1867, SALU, Abt. 2330, BASF I, 116 ff.

²⁶⁸ According to materials in SALU, Abt. 2330, BASF I.

²⁶⁹ On the contract with Jean Théodor Coupier, signed in 1868, see section 2 above. See also Travis, *Rainbow Makers*, 96–97.

²⁷⁰ Andersen, *Technikfolgenabschätzung*, 259–260.

²⁷¹ Rubner and Schmidtmann, Gutachten; see also on the following, Lauterborn, *Ergebnisse*, and Andersen, *Technikfolgenabschätzung*, 289 ff.

²⁷² Andersen, *Technikfolgenabschätzung*, 278–279.

of the chemical industry trade association).²⁷³ Public perceptions and the pressure that might arise from this on those causing the pollution were also weak. What is more, the true ecological damages and their consequences for public health were only just becoming obvious. Indeed, insofar as they were recognized at all, they were viewed as the unavoidable accompaniment to, and victim of, economic growth.²⁷⁴

Intellectual Property as a Factor of Production: Patent Issues

In contrast to ecological problems, which were hardly noticed at the time, BASF had to make far more intensive efforts to attain a decent level of legal protection for relevant inventions and discoveries made by its employees.²⁷⁵ Like other coal-tar dye producers, the company in the initial years of its existence profited from the cost-free imitation of products developed elsewhere. However, as soon as the firm was in the position of wishing to protect its own creations from possible competition, the legal situation in force at the time proved to be disadvantageous. Thus, beginning in the late 1860s, the corporation repeatedly had unpleasant experiences in the area of patent protection. This was particularly true with regard to the Prussian patent authorities, whose “technical deputation for commerce” (which was responsible for patents) remained dedicated to the economic-liberal notion that any protection for inventions and discoveries that went beyond the framework already in place would be a dubious hindrance to competition.²⁷⁶ It therefore turned down patent applications for the methods of benzene washing and for the manufacture of alizarin (1869). Consequently, for a number of years, BASF pursued the genuinely risky policy of registering patents in other countries such as Great Britain, France, and the United States, but retaining in Germany its customary method of maintaining the greatest possible levels of secrecy. As a result, on more than one occasion, other firms wrong-footed BASF by registering a patent, leaving the Ludwigshafen company only the cumbersome way out of claiming at least for itself the right to further manufacture of the patent through the so-called “right of previous use.” The decision not to patent “Eosin” proved especially disadvantageous since August Wilhelm Hofmann chose to publish the composition of the popular dyestuff on behalf of his former student, the coal-tar dye manufacturer Carl

²⁷³ Especially insightful here is Jurisch, *Verunreinigung*, especially 108. See in general Andersen, *Pollution*, 268 ff.

²⁷⁴ Anderson, *Pollution*, 189 ff, especially 195 ff; Henneking, *Chemische Industrie*, especially 406 ff. On the problem of dyes in foodstuffs, see in general Spelsberg, *Fieber*, 42 ff.

²⁷⁵ On patent legislation, see especially the work of Zimmermann, *Patentwesen*, as well as Kuczynski, *Teerfarbenindustrie*, and Fleischer, *Patentgesetzgebung*.

²⁷⁶ On Prussian patent law and the way it developed in the context of the anti- and pro-patent movement, see Heggen, *Erfindungsschutz*, especially 69 ff.

Alexander Martius of Agfa. Thereupon, all those interested were able to manufacture it.²⁷⁷ The same thing happened with chrysoidine.²⁷⁸

Besides the Association of German Engineers (*Verein Deutscher Ingenieure*), it was to an even greater extent the German Chemical Society (*Deutsche Chemische Gesellschaft*) that, after it was founded in 1867, lobbied for an improvement in patent protection for the chemicals in Germany. After 1874, the German Patent Protection Association (*Deutscher Patentschutzverein*) consolidated such efforts into one organization and contributed heavily to the passage of a new patent law in 1877. The Imperial law, a reaction to the altered political and economic climate at the time of the “Great Depression” of 1873–1895, but also a reaction to shifts within German industry itself, especially in the science-oriented “new” industries, removed the heaviest of the legal deficits, at least for the German market. It created German unity at the level of patent law. What is more, it protected first of all the manufacturing process and not the product itself; and second, in contrast to the simple system of registration that was typical in England, for example, it required a thorough examination of discoveries to test their novelty. Only once this was proven could they be protected against potential competition. Since the law awarded the holder of the patent a monopoly over production on this basis for the following 15 years, it opened the best possible profit vistas for successful research and the investment made in its development. On the other hand, however, the legal framework also encouraged the competition to come up with other processes or substitute products (circumvention patents), with which it could break through the monopoly that had been established. Thus, the new patent legislation – unlike that in existence in France or Britain – formed an essential precondition for the long-term and intensive research work that came to characterize the German chemical industry and thus contributed heavily toward the establishment of the eventual de facto global monopoly of German coal-tar dye companies.

All the same, from the perspective of the chemical industry, the German patent law of 1877 left a number of loopholes that required closing. It was no accident that the Society for the Protection of the Interests of the German Chemical Industry (*Verein zur Wahrung der Interessen der chemischen Industrie Deutschlands*, or VCI) was set up in 1877, incidentally on an American model.²⁷⁹ BASF was a member from the outset, and in the years that followed, it pushed to further develop patent law and to make it more precise. In the person of Heinrich Caro, BASF possessed a superb expert for patent issues on account of his extensive scientific knowledge and his practical experience. On Caro’s initiative, BASF suggested to the VCI in April 1879 that it should establish a specialist department for patents,²⁸⁰ and already in

²⁷⁷ Travis, Rainbow Makers, 213–214.

²⁷⁸ Zimmermann, Patentwesen, 20–21; Schuster, Wissenschaft, 53–54.

²⁷⁹ Beer, Emergence, 103 ff.

²⁸⁰ Zimmermann, Patentwesen, 26 ff; Fleischer, Patentgesetzgebung, 99 ff.

September of the same year, a chemical patents conference in Baden-Baden met to discuss this initiative. The delegates came to the conclusion, mainly on the basis of a presentation by Caro himself, that not only processes, but also products, should be accorded patent protection.²⁸¹ Caro pursued this aim not only as chairman of the VCI's patent committee, but also as a respected expert witness in decisive lawsuits held before imperial courts, all with considerable success. At the end of the day, the highest court in the land gave direction to future patent legislation by declaring the following two basic principles. First, the protected method of fabrication and the product that resulted directly from it were to be viewed together as the "object of invention."²⁸² Second, even the discovery of a new technical effect in the course of an otherwise routine manufacture of new dyes was patentable.²⁸³

After years of consultation and hearings, moreover, the revised patent law of 1891 in the end took on board one of the central demands of the VCI's patent committee: Evidence that a material protected by patent was in fact manufactured using a process that was not yet patented had to be submitted by the producer who had been accused of suspected patent infringement. Showing a united front primarily against the continued imitative production by Swiss chemical firms, legal opinion and legislation finally made scientific research a worthwhile investment in the future, at least as far as the territory of the German Reich was concerned.

But in spite of the improved protection of research activity in Germany, patent issues remained major areas of concern for the internationally active chemical industry, mostly owing to the different legal positions of the various nation-states. A series of often time-consuming and exhausting trials – especially in Great Britain and the USA – to gain recognition for patents applied for there usually kept lawyers busy through several layers of courts. The fight with Bayer over the lucrative alizarin patent in the United States, for example, lasted from 1875 through 1884. After winning four trials, BASF lost the fifth time around to Bayer's appeal.²⁸⁴ On the other hand, in the true-red dye (*Echtrot*) trial with the English firm Ivan Levinstein Ltd., following six years of legal action, the Ludwigshafen-based corporation won its case before the House of Lords as the third and highest level of court.²⁸⁵ In fact, beginning in the 1880s, patent work – especially with regard to foreign

²⁸¹ Ungewitter, Kapitel, 286 ff; Zimmermann, Patentwesen, 34 ff.

²⁸² So the judgment of the Reichsgericht from 1888 in the methyl blue case between BASF and the Swiss firm J. R. Geigy. See Zimmermann, Patentwesen, 40–41; Fleischer, Patentgesetzgebung, 138 ff.

²⁸³ So the judgment of the Reichsgericht from 1889 in the Congo-red trial. See Zimmermann, Patentwesen, 44 ff; Fleischer, Patentgesetzgebung, 142 ff.

²⁸⁴ Zimmermann, Patentwesen, 114; Travis, Rainbow Makers, 210–211.

²⁸⁵ See AR from October 12, 1885 and October 17, 1887; Zimmermann, Patentwesen, 72 ff; Travis, Caro, 266–267. Material is also available in BASF UA, E 5/1b/3, while in E 5/1a, there is a whole series of complaints by BASF against the patent applications submitted by other firms between 1879 and 1884.

countries – began to mount up spectacularly. It reached such an extent that Caro began to concentrate on it fully starting in 1887. After he left the managing board, the firm began building up a patent department under the Frankenthal attorney Max Hecht. When he died at an early age, the department passed to August Bernthsen, the head of the main laboratory, who had already functioned as a scientific advisor to Hecht. As a result of this increased responsibility, Bernthsen was given authority to sign contracts on behalf of the firm.²⁸⁶

The patent department in fact had to deal with a considerable caseload, and it was one that showed a tendency to rise clearly over time. Between 1889 and 1904, it processed 773 firm-internal patent applications and 56 from other inventors. What is more, it dealt not just with the Reich area, but also with a total of 1,466 applications abroad, especially in Great Britain (388), France (374), and the USA (348).²⁸⁷ In addition, it was responsible for cooperating with the relevant specialized laboratories in checking the patent applications of other firms in order to ascertain whether BASF patents were perhaps being infringed, or whether at the very least the firm could claim a right of first usage for a particular process.

It was, of course, especially true in the chemical industry that fights broke out easily about the priority of inventions and discoveries. After all, the same or very similar dyes could be produced using different chemical procedures. What is more, the varied legal position within and outside Europe also had an impact on the relationship between competing firms. The answer to the question of whether to appear as an opponent before the court or to try to come to some sort of understanding outside of it depended to a large extent upon an estimate of one's own chances and of the strengths of one's counterpart. In the end, lack of security about how long-running trials would come out promoted a willingness to "compromise."²⁸⁸ Compromises included, for instance, giving the opponent a license for an agreed fee, but also cartel agreements with regard to disputed products, markets, and prices. The beginnings of such "conventions" came in the 1870s, but increased in the chemical industry especially during the 1880s. The objective was to make markets more predictable and manageable.

Integration into the Marketplace

This brings us to the issue of BASF's market strategies. After all, next to its performance in the areas of research and production, the rise of the firm to

²⁸⁶ Bernthsen, 50 Jahre, 41 ff; AR from June 30, 1898, BASF UA C 112. Further material is in BASF UA, B 10/01.

²⁸⁷ VT I, 337–338.

²⁸⁸ See, for example, the "compromise" between BASF and Agfa of April 17, 1883 to allow A. Baeyer and Kekulé as arbiters in a dispute over the Agfa phenyl blue patent. The expert report of August 7, 1883 came out on BASF's side. See Urkunden, vol. 2, 59.

leadership in its sector was heavily shaped through its successful position in national and international commerce. The more that growing competition among the dyestuffs producers placed prices and profits under pressure, and the more the seller's market that existed initially became a clear buyer's market, the more that sales and purchasing gained in significance. Of particular importance in this regard for the company were two factors: an efficient marketing organization and persistent product advertising. As far as the international market was concerned, the managing board had to decide on the basis of judgments about the economic policy of the state in question whether and where establishment of production capability abroad was advisable and profitable. In relation to its competitors, the board in the "age of cartels" could often opt either for free competition or for market regulation through agreements between producers.

Successful Marketing: The Creation of a Modern Sales Organization

By virtue of the fact that BASF from the very beginning decided to produce most of the inorganic materials it needed on its own and sold virtually all of its output through only four firms,²⁸⁹ Engelhorn was initially able to limit the external commercial relations of the new corporation. As a consequence, he could also limit the effort that building and maintaining such relations necessitated. However after only a few years, it became clear that a change of direction was required. The fusion with the Stuttgart-based competitors, Knosp and Siegle, was designed primarily to gain at a reasonable cost previously insufficient commercial know-how and direct contact to customers, who were being won over by a growing number of alternative suppliers. The fusion obtained for BASF a network of subsidiaries and representatives that was already in place and that stretched beyond German borders. As a result, the company's position in this strategically central field was especially strong for a long period of time, even compared to its largest competitors.

Gustav Siegle, the creator of the well thought-out sales organization, expanded it further during the decade and a half of the fusion into the centers of the dye-processing industry on the European and North American continents. For this purpose, he regularly traveled to England, Scotland, and France, but also repeatedly visited the USA and Russia. He also kept good contacts with Scandinavia,²⁹⁰ and in the end he brought Asia – and in particular China and Japan as increasingly important markets²⁹¹ – into his planning. Commercially and technically well-trained travelling salesmen were attached to each of the representations on the ground. Once they had

²⁸⁹ These were the Verein Chemischer Fabriken for inorganic products, and the firms of Knosp, Siegle, and Dahl for dyes.

²⁹⁰ See Piloty, Siegle, 71–72; Glaser, Erlebnisse, 98; Schuster, Farbenhandel, 72.

²⁹¹ Beginning in 1882, there were connections with the Ehlers firm in Shanghai, while in 1886 deputy director Sproesser traveled to China and Japan. AR from November 28, 1885, BASF UA, C 112.

completed the internal training course, these men took up direct and continuous contact with customers in the “regions” they would be entrusted with, informing and advising them.” Consequently, they were able to collect insight into trends in fashion and information on the customers’ wishes and complaints. They were then able to send valuable suggestions for further product planning back to Stuttgart and Ludwigshafen.²⁹² They therefore formed a pool of knowledge, which was always in short supply, for the leading personnel in the increasingly differentiated sales department. Given that the bulk of German coal-tar dye products were exported, it is clear just how important this offensive, but also flexible, sales strategy was.

In the domestic market, on the other hand, BASF had moved fairly quickly into a position of only selling directly to customers. If through the end of 1872, the corporation had sold most of its dyes via the Dahl, Knosp, and Siegle firms, it was in direct contact – largely owing to the fusion – with over 5,000 customers by the end of 1873.²⁹³ By 1885, this figure had risen to 11,500, not counting the customers of the firm’s subsidiaries, which were responsible for about three quarters of sales turnover in dyes.²⁹⁴ For foreign sales, in contrast, especially in its early phase, the firm relied primarily on export firms, and eventually on commercial houses in the respective countries in which it operated.²⁹⁵

In so doing, BASF paid close attention that the respective firm abroad did not work on its own, but rather for a commission or for a share in the profits and as an agent for BASF trade wares. It was only by this means that Ludwigshafen could obtain local information on customers and prices and also had a good chance of gaining customer commitment to its products. The method of attaching salaried employees to each of the representative agencies, each of whom had relevant technical knowledge to give competent customer advice, tended to support the same set of strategies and at the same time strengthened central control. The agencies thus developed either into exclusive agents for BASF products (as was the case in London, Manchester, New York, and Bombay); or BASF itself established sales agencies under the leadership of men with a fixed salary, who in addition also got a share of sales volume, as was the case in Moscow by 1874.²⁹⁶ The subsidiaries and sales houses thus possessed a high degree of commercial freedom of maneuver. They were sold goods at the wholesale prices given to large customers, but they were then allowed to set the sales price for the individual customers on their own. After deduction of the costs incurred by the agency, the profits that resulted were then shared equally between the agent and Ludwigshafen.

²⁹² See L. Brunck, “Lebenserinnerungen,” especially 19 ff.

²⁹³ GB 1873, BASF UA, A 15 I/9.

²⁹⁴ VT II, 54, 58–59. ²⁹⁵ See VT, 54 ff.

²⁹⁶ On this there are continually recurring mentions made in AR, BASF UA C 112.

As far as local business practices were concerned, in competition with other companies, BASF pursued sales on the basis of commercial principles and sought to fight against the “demoralization” of sales practice, even if there was a danger of losing considerable business in the process. Following in the footsteps of Siegle, August Hanser, who served as commercial director from 1889 to 1895, played an important role in this respect.²⁹⁷ In 1891/92, he undertook an initiative to combat the particularly “difficult demon” of “reimbursement” in Russia, apparently with some success.²⁹⁸ And, at about the same time, he made sure that the contract with the representatives of BASF in Manchester with whom the German firm was involved in a conflict, were ousted. He instead charged salaried employees from Ludwigshafen with the takeover of the agency in England. Hanser even went so far as to make sure that the decision was enforced in a court of law when the two representatives who had been active to that point decided to lodge a complaint against the firm. Hanser’s successors, moreover, continued the tradition – which did so much to place a stamp on the company’s image – with gusto.²⁹⁹

Much more important than this sort of rear-guard action against irregular methods of competition, however, were further elements of a “positive” sales strategy. Included here were the beginnings of modern brand advertising. Firm-specific trademarks, protected by entry into the official commercial register, secured (in particular for relatively unsophisticated customers in the non-European area) brand recognition.³⁰⁰ Naturally, BASF also advertised through submitting its products and winning awards at regional and international industrial trade fairs, especially world’s fairs. To the awards earned by the old firms of Knosp and Siegle were added a large series of gold medals and honorary diplomas³⁰¹ conferred on Ludwigshafen all over the whole world. These, of course, then found their way as advertising materials into firm brochures and packaging. In fact, the brochures that accompanied individual exhibitions of products formed an important piece of public relations work. They transmitted a positive picture not just of the variety and quality of the products, but also, by highlighting in particular its “welfare facilities,” of the company’s social engagement. At the Paris world’s fair in 1900, BASF received two “grands prix” for this.³⁰²

²⁹⁷ See especially L. Brunck, “Lebenserinnerungen,” 32 ff.

²⁹⁸ “Strictly confidential” letter of August 2 and October 15, 1892 in the *Direkte Korrespondenz der Direktion*, 78 ff, BASF UA.

²⁹⁹ On the further struggles of Hanser’s successors (Kächelen and Hüttenmüller) against irregularities in payment of commission, which ultimately led to the “lex BASF” of 1910 and the penalties that this law imposed for bribery of salaried employees, see Part 2, section 2.

³⁰⁰ L. Brunck, “Lebenserinnerungen,” 23 ff. In BASF UA, T 31, there is a card file with the labels and trademarks of the firms that fused into I.G. Farbenindustrie AG.

³⁰¹ BASF UA, A 11/2.

³⁰² BASF UA T 33/35. Brochures are in BASF UA, T 33/24, T 33/30, T 34, as well as A 911 (1881, 1882, 1893, 1894, 1896 (Nuremberg), 1900, 1904, and 1910).

*The Unavoidable Steps Toward a Multinational Company – Branch
Factories Abroad*

On the international marketplace, BASF's activities were not restricted to pure sales. In fact, in some cases it proved unavoidable to establish branch factories in foreign countries in order to penetrate particular markets. This could be because of the legal situation or on account of the foreign economic policy of the nation-state in question. Ahead of the other large-scale coal-tar dye producers, BASF followed this path to the multinational corporation twice in the first instance, in 1877/78, although both times with some reluctance. In the first case, it was Russia, and in the second, France. With regard to Germany's eastern neighbor, the idea was to avoid its sharpened policy of high protective tariffs and, in competition above all with Bayer and Hoechst, to gain as large a share as possible of this unusually active market, especially for red alizarin. Since it was only end-products, not intermediates, that were subject to extremely high tariffs, Glaser solved the problem for BASF in a truly unconventional way: he mixed alizarin with caustic soda and allowed it to dry. The inconspicuous black powder that resulted from this process then went through customs without any objection from the authorities, and at low cost.³⁰³ But in order to change the powder back into the conventional alizarin dye paste, BASF needed a suitable establishment. So, Glaser, who traveled to Moscow in the summer of 1877, bought a former soap factory in the suburb of Butirki and arranged for the necessary equipment to be installed. He also pressed money as needed into waiting hands ("so that all of the important official bureaus were satisfied with regard to their private desires"), and thus ensured that official permission was soon granted and that production could start in August 1877. The factory in Butirki was thus not an independent production center, but rather an "aid station specially designed for the Russian market."³⁰⁴ In this respect, BASF was far different from Bayer and Hoechst, who eventually established full-fledged manufacturing units abroad, with correspondingly high levels of investment.³⁰⁵ It proved possible, moreover, for BASF to hold this course even during the German-Russia tariff war of 1893/94, when, for a time, the danger existed that it, too, would have to move into full-scale production locally in Russia.³⁰⁶

In France,³⁰⁷ on the other hand, it turned out to be absolutely necessary to establish a subsidiary manufacturing facility in order to satisfy the

³⁰³ See Glaser, *Erlebnisse*, 98 ff.

³⁰⁴ Ibid., 100. See AR from November 1, 1879. See also (in part with errors) Kirchner, *Industrie*, 124 ff.

³⁰⁵ See Kirchner, *Industrie*, 104 ff, 135 ff.

³⁰⁶ See AAR of October 17, 1893, BASF UA, C 113. On the development of the factory in Butirki, material is in BASF UA, A 18/4, A 18/5/8ff and A 18/6. There are also scattered references in the minutes of the AR and of the AAR.

³⁰⁷ Materials are in BASF UA, A 18/1-A 18/3.

requirements of French patent law. The latter required that products patented in France also had to be manufactured there (the principle of compulsory deployment of a patent); otherwise, the relevant patent lost its validity. BASF, which was able to preserve its patent rights to the popular alizarin only with English help during the Franco-Prussian war of 1870/71,³⁰⁸ decided to enter into a partnership with the renowned firm of Thomas Frères from Avignon in 1872 in order to secure its rights.³⁰⁹ In 1878, however, it withdrew from the contract and instead leased from the Thomas firm in Neuville a branch factory under the company name of "Surcursale de la B. Anilin- und Soda-fabrik."³¹⁰ Purchased outright in 1882,³¹¹ the establishment expanded heavily in the following year because of the growing number of patents and the need to work them. However, similar to the situation in Russia, and mostly for reasons of costs, BASF generally preferred to carry out only the end stages of processing there, and thus did only what it needed to satisfy the letter of the law.³¹²

Otherwise, BASF saw no reason for financial engagement abroad. It counted as part of its patriotically colored credo: "that such a way forward could only be justified under the force of prevailing customs or patent restrictions, against which, incidentally, important economic misgivings and the danger of surrendering valuable experience and knowledge abroad must also be considered."³¹³ Starting in the 1870s, the worldwide tendency toward protectionist policies was plain for all to see. Nevertheless, owing to its dominant market position, the German coal-tar dye industry incurred no serious losses in export. The most important markets – above all the USA and Britain – remained open without major interruption, at least for the time being. Occasional "tariff wars" between the German Reich and Russia or Spain temporarily lessened earnings from the relevant nation-state, but did not actually detract from the general course of business in any noticeable way.³¹⁴ In fact, the higher import duties of the German Reich itself were sometimes more disadvantageous since they sometimes threatened to drive up prices of key raw materials (such as tar and tar products from Belgium,

³⁰⁸ Berndsen, Caro, 2004, note 2.

³⁰⁹ VR from August 28, 1872, BASF UA C 111. A reproduction of the contract from November 7, 1872 is in Zimmermann, *Über die Grenzen*, 72 ff. A draft of the contract is in BASF UA, A 18/1/2.

³¹⁰ See the correspondence with the Thomas firm in BASF UA, 18/1/4, and also the AR from October 23 and November 15, 1878 in BASF UA, C 112.

³¹¹ Documents on the painstaking negotiations through to the conclusion of the contract on June 27, 1882 are in BASF UA, A 18/1/5. See also AR from June 15, 1882, and correspondence between J. Thomas and Siegle in A 18/1/6.

³¹² Scattered materials are in the minutes of the AR and the DelAR/AAR. See also L. Brunck, "Lebenserinnerungen," 45.

³¹³ Anschütz, Müller, Glaser, 280.

³¹⁴ On this, see the brief entries in the *Geschäftsberichten*, BASF UA, C 22.

Great Britain, and France or pyrites from Spain). It is therefore not surprising that BASF, like the German coal-tar dye industry in general, tended to favor free trade and only wanted to make an exception to the rule in the case of soda.³¹⁵ And German tariff legislation by and large accommodated these interests.

In the Shadow of Sales Success: Purchasing as a Clear Deficit in the Commercial Area

If BASF's sales organization, especially under the leadership of Siegle, counted as a source of immense pride for the firm and is therefore mentioned with due respect in numerous sources, there is much less written about purchasing, despite the fact that it, too, was of immense importance to the firm's basic concept. After all, the concentration of sales in Stuttgart through spring 1889 did not relieve Ludwigshafen of the problem entirely of having to deal with purchasing goods locally. This was true not just for the supply of the factory with a variety of necessary raw materials, machines, and materials, but also for the sales of certain products such as the coke that came as a by-product of producing gas in-house. Furthermore, the packing and delivery of wares sold by Stuttgart by means of ship and rail from Ludwigshafen were also of importance. Starting in 1874, it proved to be good fortune that, once again, August Clemm was able to find a person with the talents to oversee this key field and bring him into the firm. August Hanser,³¹⁶ who had just turned 23 years old and was the son of a high-ranking official of the Verein Chemischer Fabriken, had foreign experience, and could speak several languages, was just the man. He quickly made a good career for himself within BASF. By 1877 already, he was accorded the power to sign for the firm,³¹⁷ and by 1889 he was a deputy member of the managing board. When the fusion with Stuttgart was dissolved in 1884, he became a director in the managing board,³¹⁸ responsible until his early death in 1895 for overall commercial leadership at BASF.

Almost 40 years after the fact, those who lived through the period reported on the problems and methods of purchasing at the end of the nineteenth century.³¹⁹ According to eyewitness accounts, the purchasing department operated with a modest level of personnel and the most primitive furnishings and equipment within a network that reached far abroad, but also targeted local suppliers. In China, for instance, specialist products such as Chinagallen were ordered. Via dealers located in Hamburg and Mannheim, the department took shipment of Chilean saltpeter "by the seagoing steamship

³¹⁵ On the principles followed by BASF with regard to customs issues, see the *Geschäftsbericht* for the year 1878, BASF UA, C 22; and in general, Beer, *Emergence*, 109–110. On German tariff legislation, Müller, *Industrie*, and Ungewitter, *Kapitel*.

³¹⁶ See Glaser, *Erlebnisse*, 81–82; Jacob, Engelhorn, 43.

³¹⁷ AR from October 23, 1877, BASF UA, C 112.

³¹⁸ AR from May 11, 1889, BASF UA C 112. ³¹⁹ See VT II, 297 ff.

load." And other raw materials, too, came from far afield, for example benzene from Glasgow and naphthalene from the Paris-based Gas-Compagnie. On the other hand, however, BASF ordered its daily requirements of iron and steel and many of its materials from productive and efficient local firms in the interest of maximizing flexibility.

At the same time, though, following the Siegle era, BASF demonstrated unmistakable weaknesses in the commercial area in the face of the growing pressures of competition and rationalization, which can be explained historically for the most part. The spatial and functional separation of purchasing and sales that had existed for a number of years had long-term ill effects despite the unified leadership in Ludwigshafen beginning in 1889. This was especially true since August Hanser's early death left a hole that was difficult to fill and made a comprehensive reorganization of the commercial area more difficult.³²⁰ Through the end of 1905, the organizational separation of the fabrication departments (*Abteilungen F*) from the purchasing and sales sections (*Abteilungen V*) continued, even in the area of bookkeeping. What is more, the production units insisted on their autonomy in ordering materials. They made decisions on the products to be acquired and their manufacturers without allowing the purchasing department to ensure greater competition for BASF's business.³²¹ Even sales were dealt with separately by the individual departments. It was only the formation of the Dreibund that made for concentration in this area as well as proper reorganization and restructuring in the interest of greater efficiency.

Similar deficits also appeared in the area of accounting. The lack of unified internal methods of calculation to reliably ascertain production costs became increasingly burdensome for BASF's salesmen in the heightened competition that came about with the end of the nineteenth century. The individual factory plants delivered intermediate and subsidiary products to other parts of the concern with frequently very high mark-ups (in their own interest). The result was that the cost of the final products already contained substantial hidden profits. Under such conditions, it was hardly possible to determine at what price a product could be sold for in order to at least regain production costs.³²² Again, it was the agreements with the other participants of the Little IG that led to the formation of a cost-calculation department along the lines of the progressive Elberfeld model. This department was responsible for the company as a whole and, through guidelines applied in a uniform manner, it guaranteed the required level of transparency.³²³

Between Free Competition and Market Regulation: Conventions

The German coal-tar dye industry provided the evidence that mass production and intense competition not only made possible, but also required, more rational production processes. Its development furthermore had positive

³²⁰ See L. Brunck, "Lebenserinnerungen," 10 ff. ³²¹ Ibid., 16 ff. ³²² Ibid., 13–14.

³²³ K. Weis, "Erinnerungen," BASF UA, T 001/12; VT I, 536 ff.

effects on the economy as a whole, not necessarily leading to ruinous competition of the sort feared by concerned contemporaries. The sector, as it turned out, could move with relative ease away from the path of market competition through agreements among its component firms and eventually through large-scale fusions. It did so to an ever-increasing extent, especially in the classic land of cartels, Germany.³²⁴ At the same time the number of such agreements to regulate the market remained relatively modest until the mid-1890s, at least compared to other areas of the economy. This plainly had much to do with the fact that the large firms manufactured a number of patented products that brought in such good earnings that the companies were willing as a rule to uphold the principle of competition.

Noteworthy exceptions to this rule included, initially, the first indigo convention with Hoechst in 1880, which established a patent company. This was followed by the previously mentioned red alizarin convention of 1881, an especially significant case that was meant to regulate prices and production quantities of the most important product of the time for most of the largest dyestuffs factories. A precursor to this was the agreement of October 4, 1877 between BASF and the English firm of Burt, Boulton & Haywood in London, which starting in 1876, owned William Perkin's alizarin patents. The two companies were joined in the agreement by Bayer, Hoechst, and Carl Neuhaus (Elberfeld) as licensees. The goal was to protect themselves in the lucrative English market from patent infringements by other parties, but also to unify on delivery quotas for the individual licensees.³²⁵ The establishment of a defense fund and regular meetings between the parties to the agreement³²⁶ served as a first step for more comprehensive market regulation. The agreement, however, did nothing to stop the continuing slide in the price of red alizarin: The price per kilo, which had been 120 marks as late as 1872, sank to 23 marks in 1878 and to just 17.50 by 1881. For the majority of producers still remaining on the market, this was fast approaching the limits of profitability. BASF, however, was among the firms that might have been able to risk further price wars with good chances of a positive outcome, and so the young chemists Brunck and Glaser therefore came out in favor of a continuation of free competition. They were overruled, however, by the commercial calculations of Engelhorn and Siegle. The cartel of September 1881 included nine German companies and one English firm.³²⁷ The partners

³²⁴ See Maschke, *Grundzüge*, as well as the articles in Pohl, ed., *Kartelle*, and in Horn and Kocka, eds., *Recht und Entwicklung*, 275 ff. See also Schröter, *Kartellierung*, 457 ff.

³²⁵ Zimmermann, *Patentwesen*, 108 and appendix. Materials on the negotiations are in BASF UA, T 84/1/5-7, and the contract is in Urkunden, vol. 1, 47. A contract from July 29, 1880 built upon this earlier agreement, dealing with procedures and cost sharing in dealing with patent infringements. Urkunden, vol. 2, 54.

³²⁶ Travis, *Rainbow Makers*, 202.

³²⁷ The initial participants included BASF, Farbwerke Hoechst, Farbenfabriken Elberfeld (Bayer), Carl Neuhaus (Elberfeld), Burt, Boulton & Haywood, Gauhe & Co., Dr. C.

agreed on a total daily production of 50,000 kg of dye paste with a solid content of 10 percent, and assumed 25 working days per month.³²⁸ (This initially excluded the American market, for which BASF had the patent for some time.) The three largest firms – BASF, Hoechst, and Bayer – each received 20 percent of this total. A committee under Engelhorn's leadership was charged with making sure that agreements on the types of goods to be sold and on minimum prices were upheld.

At the same time, the alizarin convention did not show much stability. In fact, it was ended in August 1885 after long-lasting internal quarrels by the partners, and without Ludwigshafen doing anything to prevent it (owing to BASF's judgment of its own capabilities),³²⁹ this despite the fact that it had in the short term led to sharply increased profits. Its demise resulted from the usual difficulties encountered in such cartels. The policy of the cartel, oriented toward monopoly, brought into sharp focus the differences of opinion among the members over price formation and market share, each of which saw these issues in relation to their own chances on the market were the cartel to be dissolved. What is more, the cartel improved the profit outlook for outsiders and had the effect that customers on the especially important English market were driven together to establish an alizarin factory of their own. The British Alizarin Co. then went on to take on the German producers fiercely as their only foreign competitor.

In the years that followed, BASF repeatedly used “conventions” with rather different orientations and remits as instruments of improving – or at least holding onto – the firm's position in smaller market segments. One example of this was the agreement made in 1883 with five competitors on the production, prices, and conditions of the sales of caustic soda.³³⁰ In 1888, BASF came to an understanding with Hoechst and with the firm of Georg Carl Zimmer in Mannheim on patent licensing and market share in the area of the German Reich for the ever-popular methylene blue.³³¹ In the same year, the Ludwigshafen-based firm entered into an agreement with its competitor, the Gesellschaft für Chemie in Basle (earlier, Bindschedler & Co.), on the development of rhodamine dyestuffs in order to avoid threatening patent disputes, but also to gain patents desired by BASF.³³² In 1888/89, it came to an agreement with Ivan Levinstein and two other English firms on

Leverkus & Söhne, and J. Brönners Fabrik. Not long after, Arzberger, Schöpf & Co. joined the convention, as did Franz Rabeneck, from Moscow. See Glaser, Brunck, 18, note 1. A copy of the contract signed in Cologne on September 5, 1881 is in BASF UA, T 84 (788).

³²⁸ When the two additional companies joined the cartel, each of which produced 1,000 kg per day, the total daily agreed-upon production rose to 52,000 kg.

³²⁹ Materials on this are in BASF UA, A 15/3 and T 84, as well as in the minutes of the AR and the Vorstand (January 1884–July 1885), in BASF UA, C 12.

³³⁰ BASF UA, T 81.

³³¹ Zimmermann, Patentwesen, 40 ff; Fleischer, Patentgesetzgebung, 137–138.

³³² Reinhardt, Forschung, 164–165.

the supply of naphthol yellow, or citronin, to Britain and the USA.³³³ In the case of the substantive azo-dyes, BASF cooperated with the firm of Dahl & Cie. in Barmen,³³⁴ and in 1890 entered into a secret agreement with the Merck Company in Darmstadt on the supply of methylene violet 2B extra and of auramine o pat. as antiseptics under the trade names "Blavin" and "Goldin."³³⁵ A contract of 1897 with the English firm Brooke, Simpson & Spiller regulated the delivery of oleum for sale in England,³³⁶ and a year later BASF made a three-year agreement with Griesheim Elektron on the production and sale of sulfuric acid-monohydrate in order to avoid an undesirable competitive situation.³³⁷

In general, however, conscious of its own considerable strength, BASF chose the course of intense competition. Repeated attempts by Carl Duisberg starting in 1893 to bring about a basic agreement between Bayer and BASF in the bitterly contested field of alizarin dyes only paid off in spring 1900 after Ludwigshafen suffered a crushing defeat at the hands of the patent office.³³⁸ In mid-March, the two firms came to an agreement over the blue mordant alizarin dyestuffs,³³⁹ and a few weeks later the two were joined by Hoechst in forming a "syndicate in the field of alizarin red dyes," "in order to stop mutual underbidding in prices and to provide a counterweight to the union of dyestuffs customers that had recently been formed."³⁴⁰ Two months later the agreement was expanded by the addition of other firms³⁴¹ and, through a whole bundle of contracts, fashioned into a comprehensive price and quantity cartel.³⁴² This development demonstrated the growing willingness of the large-scale coal-tar dye factories, in view of their position of oligopolistic market dominance, to choose the seemingly worthwhile path of making agreements rather than the risky one of continuing hard-fought competitive battles. No longer was the convention an emergency measure adopted at times of crisis, as had been the case with the first alizarin convention. Rather, in the context of renewed economic expansion, this action was now aimed at securing long-term market dominance, cost savings, greater consistency in production, and as high profits as possible. The Little IG of 1905 with Bayer and Agfa, which again came about largely because of Duisberg's initiative, sought to institutionalize this policy of mutual agreements among a relatively small number of dye factories.

³³³ Travis, Caro, 267 ff. ³³⁴ Reinhardt, *Forschung*, 172.

³³⁵ BASF UA, T 84, correspondence from April 9–25, 1890. ³³⁶ BASF UA, T 81.

³³⁷ BASF UA, T 81. ³³⁸ Flechtnar, Duisberg, 129 ff. ³³⁹ BASF UA, T 84 (788).

³⁴⁰ Thus stated in the contract of the syndicate with the firms of Gauhe & Co. and Karl Neuhaus of April 14, 1900.

³⁴¹ Thus, with regard to alizarin red, Gauhe & Co. (Eitorf), Karl Neuhaus (Elberfeld), British Alizarine Co. Ltd. (London) and Ludwig Rabeneck (Moscow)/Wedekind & Co (Uerdingen).

³⁴² The series of contracts, signed in Paris on May 25, 1900, are in BASF UA, T84 (788).

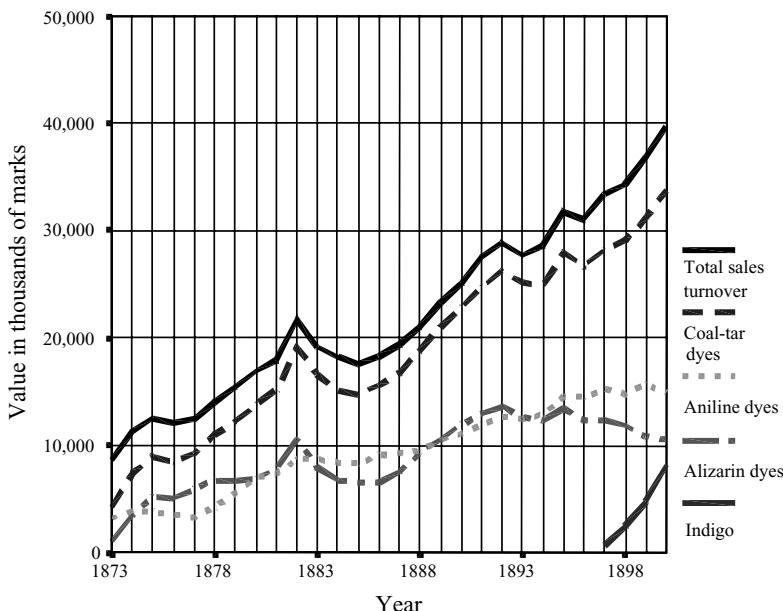


Figure I.2. BASF, Sales Turnover in Thousands of Marks, 1873–1900.

The Expression of Economic Success: Sales Turnover, Markets, and Profits and Their Use

BASF's capability and economic success found their ultimate expression in the company's results. Understandably enough, yearly corporate reports, including a balance sheet as well as calculations of profit and loss, enable only a very general analysis, especially since the legal requirements on balances at the time allowed considerable freedom of maneuver to the firm in question. Nevertheless, the data available tell us enough – at least in a long-term perspective – to allow an investigation of turnover and its components, markets, and also profits and the way they were deployed, all important aspects of the development of the firm.

Sales Turnover and its Components

Between 1873 and 1900, the sales turnover of BASF rose at an average annual rate of 5.8 percent, from 8.6 to 39.7 million marks. This latter figure was also 4.6 times the level of the firm's initial sales. (See Figure I.2.) The fluctuations in the trend line during the first decade of the fusion were caused primarily by developments in the alizarin market. This is especially true for the brief boom in 1882, which resulted from the alizarin convention, and for the decline in sales turnover during the next three years, which

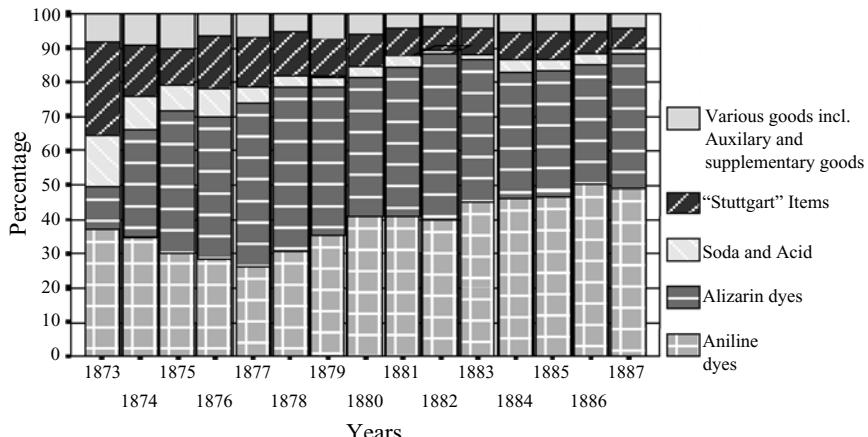


Figure I.3. Product Range in Percentage of Total Sales Turnover, 1873–1886.

came about through renewed price falls for red alizarin. It was no accident that during this period of crisis fundamental differences of opinion emerged within the managing board about the future direction of the firm, something that ultimately ended in the new beginning represented by the “Brunck era.” The increase that started in the mid-1880s, in contrast, was relatively gradual and steady, and without major setbacks. The “Great Depression,” which had such a major impact on other sections of the economy between 1873 and 1896, had therefore at most short-term effects on the innovation-oriented corporation.

One of the factors responsible for this, it is clear, was the increasing diversification of an ever more varied and improved product palette. Older products were replaced in part by successful novelties, or lost their previous significance entirely as a result of more beautiful and longer-lasting creations from the laboratory. Figures I.3 and I.4 show the changes over time in relative weight within the product palette for a number of categories. The absolute supremacy of dyestuffs production is impossible to overlook in this context. In contrast, the contribution of inorganic products to the firm’s final results was only a few percentage points in 1877 (on average between 1873 and 1888, the proportion amounted to 3.9 percent). Even the introduction of the sulfuric acid contact process did not lead to a major or sustained increase in the share of inorganics, with the average amounting to just 5.1 percent between 1889 and 1900. One thing that must be taken into consideration in this context, though, is the fact that most of the firm’s production of inorganic chemicals continued to be used in the first instance for its own dyestuffs production. But in any case, in contrast to the sales levels for inorganics, the share of dyestuffs manufactured in Ludwigshafen rose from 70 to 85–90 percent of total sales volume, largely at the cost of the pigment dyes that

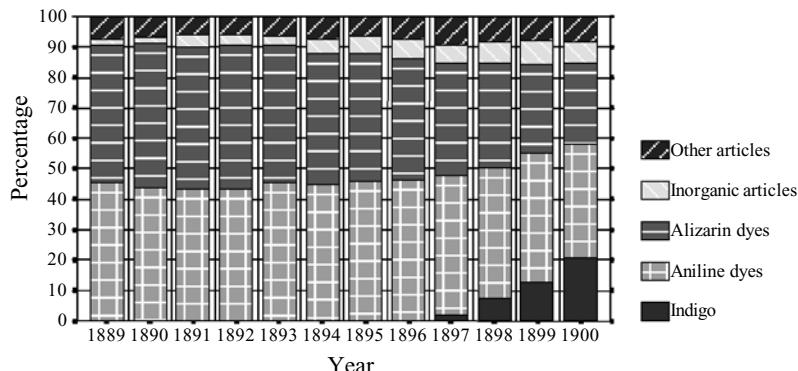


Figure I.4. Product Range of BASF, 1889–1900.

continued to be produced in Stuttgart. Within this area, the products of the alizarin department dominated at first, accounting for between 41 and 48 percent of total sales turnover on their own between 1875 and 1883. From 1889 and 1900, however, their share in total coal-tar dyestuffs sales dropped from half to 31 percent (on average 45 percent), and in total BASF sales from 45 to 27 percent (on average 39 percent). The trend, moreover, continued beyond that point. More than anything else, it was the once so highly prized red alizarin that could hardly gain in market share without this being offset by the other shades of alizarins. Anilines, on the other hand, developed more favorably, largely owing to the variety of its output (pure aniline dyes, naphthol and azo-dyes, resorcin dyes). These finally overtook the alizarin dyes in terms of sales volume in 1894 and maintained approximately a 45 percent share by total sales volume. This quota sank under 40 percent only in 1900, with the start of indigo's march to victory. At that time, indigo accounted for nearly 25 percent of all dyestuffs sales and more than 20 percent of BASF's total sales volume.

The Globalization of Markets

Together with increasing diversification owing to a continuously enlarged and improved product palette, the growing globalization of the marketplace tended to have a smoothing effect on business results in the coal-tar dye industry, even if acting on the worldwide market sometimes, and unavoidably, led to difficulties. Presidential elections in the USA, for instance, left their traces in regional sales balances, as did the Boer War in South Africa or the Boxer Rebellion in China.

But what were the major markets for BASF's products? Thanks to its position of international leadership, the German coal-tar dye industry was able to satisfy about 88 percent of world demand for dyes prior to World War I, and BASF had a substantial proportion of this. About three-fourths

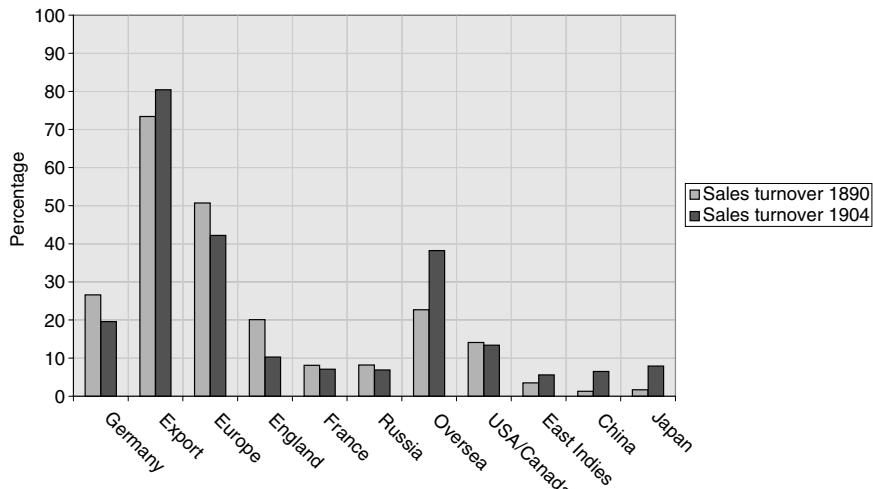


Figure I.5. Sales of BASF Products by Country and Region in Percentages, 1890 and 1904.

of its production of dyestuffs during the 1880s and 1890s was exported, amounting to an average annual share of about 24 percent of total German dye exports in the 1880s and of about 28 percent per year on average in the 1890s. With a total sales volume of 34 million marks in 1900, for instance, the company delivered an estimated 28 percent of domestic, and about 24 percent of worldwide coal-tar dye production.³⁴³

Starting with the years 1883–88, sales data broken down by region and by major country exist. At that time, the German market absorbed about one-fourth, and the rest of Europe more than half, of total production. Great Britain imported more than 20 percent of total German sales. Russia followed with approximately 9 percent, France with 7 percent, and Austria-Hungary with 6 percent. In terms of overseas markets, America³⁴⁴ was the most important, with 16 percent of the total, with Asia accounting at that time for no more than 4 percent.³⁴⁵ These relationships between export and domestic sales only changed in the period between the end of the fusion with the Stuttgart-based firms in 1889 and the founding of the first, “Little” IG in 1905, and the change was in favor of exports. Within the export category, the main concentration moved from Europe to overseas markets since demand on the old continent grew much more slowly compared to

³⁴³ Calculated on the basis of VT II, 96, 174–175.

³⁴⁴ By and large, this must be North America, although the data are not broken down any further.

³⁴⁵ According to VT, II, 69–70.

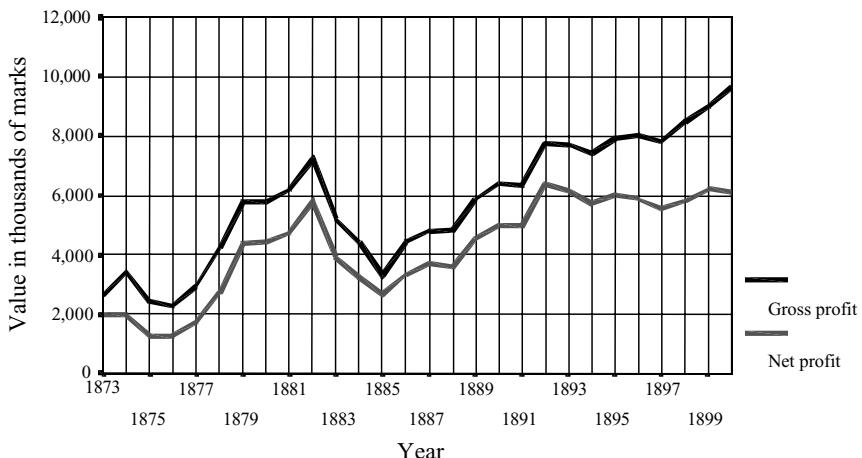


Figure I.6. Gross and Net Profit of BASF, 1873–1900.

that elsewhere. More than anything else, the complete stagnation of exports to England, which continued as the largest single European consumer of German-produced dyes, had a significant impact. In contrast, markets in India and East Asia (primarily China and Japan) grew by leaps and bounds, mainly owing to the fact that these countries more than any others now imported synthetic indigo in larger quantities as a substitute for the inferior natural product.³⁴⁶ The data for the years 1890 through 1904 are presented in Figure I.5 and offer a more precise insight into the changes in the destination of BASF's dye exports, which were to continue apace in the following decades.³⁴⁷

Generous Write-offs, Directors' Fees, and Bonuses, High Dividends, and Extensive Capital Reserves: Profits and Their Use

Only a fraction of the total turnover of the firm – although a substantial fraction! – remained available to the company after the deduction of production costs in the form of gross profit. Between 1873 and 1900, it went up 3.7 times, from 2.6 to 9.6 million marks. (See Figures I.6 and I.7.) Following strong fluctuations through the middle of the 1880s, it stabilized at a level of 21–26 percent of turnover, with the average proportion between 1873 and 1900 amounting to 26 percent. Through its extraordinarily generous write-off policy, the BASF was able to channel more than one-fourth (26.4 percent) of this to its own ends during this same period. The write-off, allowance was always considerably more than the legal minimum of 5 percent of book value, and, starting in 1878, it almost always reached the maximum

³⁴⁶ The data on sales of indigo by region are in VT II, 169. ³⁴⁷ See VT II, 226 ff.

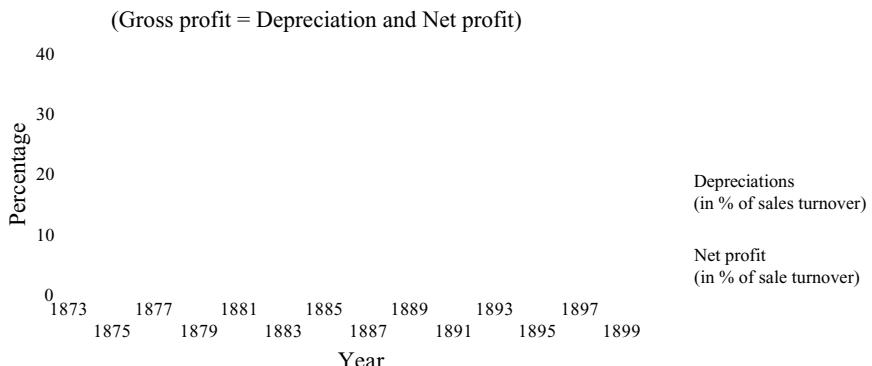


Figure I.7. Gross and Net Profit of BASF in Percent of Total Sales Turnover, 1873–1900.

permissible level of 15 percent per annum. Of the total value at time of purchase for various items bought between 1873 and 1900 – which amounted in all to fully 64.8 million marks – already two-thirds of it (including land and buildings) was written off in this way by the end of 1900!

But even with these considerable deductions from gross earnings, fairly large net profits remained. Net profit amounted in the period 1873 to 1900 to more than 119 million marks, in other words, nearly one-fifth (19.1 percent) of the total value of the turnover. This was an indication of just how high profits could be in the coal-tar dye industry even during the Great Depression. Part of the net profit, amounting to more than 9 million marks between 1873 and 1900, or 7.5 percent of turnover (although still nearly 46 percent of the share capital at the time!), was transferred to several different reserve funds in order to strengthen the means of production.³⁴⁸

But all of this did not cause the stockholders any real hardship. According to the firm's statutes, 5 percent of paid-in share capital was to be made available to them as their first dividend. Up to 20 percent of the firm's profits that remained after deduction of the first dividend was paid out as directors' fees to the members of the supervisory board (3 percent), and to the managing board and high-ranking managers known as "Beamte" (together up to 17 percent) according to a formula that had been agreed to by the supervisory board.³⁴⁹ The general assembly of shareholders could decide what to do with the remainder of the profits after this payout, and generally this involved payment of superdividends that could be higher or lower depending on the

³⁴⁸ See the statutes of the firm in BASF UA, A 12/1 and 12/2.

³⁴⁹ On the rules and their alterations over time, see AR, for example April 2 and October 8, 1874, March 31, 1875, April 29, 1878, April 29, 1881, June 25, 1885, all in BASF UA, C 112.

earnings situation. Total dividends (i.e., the 5 percent basic dividend plus the super-dividends) between 1873 and 1900 amounted to more than 88 million marks, a figure corresponding to 18.7 percent of the paid in share capital per annum on average, or 14.1 percent per annum of the total turnover. Between 1889 and 1900, the rate tended to rise above 20 percent of the value of the stock capital, and in fact averaged 24.2 percent per year, compared to 14.4 percent per year in the fusion period. In this respect as in several others, BASF occupied the top position within the coal-tar dye industry, and even more so in the chemical industry in general.³⁵⁰

Naturally, it was not in the interest of the managing and supervisory board members to broadcast these happy statistics too widely. When a stockholder submitted an application in 1876 to publish the balance sheet each year, the chairman of the supervisory board insisted that he withdraw it since "such a practice was not in the interest of the business." The supervisory board in fact even decided against handing out a printed copy of the balance sheet or performance reports to stockholders in order to exclude any possible risk of publicity relating to it.³⁵¹ And when the new joint-stock corporation law came into force in 1884, requiring public notification of balance figures, the managing board sought to limit this duty to the lowest possible level and expressly refused to answer questions from the press about the publication of balances.³⁵²

Naturally, profits and the prospect of profits had an effect on the market, as opposed to the nominal, value of shares. But it is difficult to find evidence about changing "stock exchange" values for the early period since all of the shares were in the hands of just a few stockholders. But when the stock was introduced by the Deutsche Vereinsbank to the Frankfurt stock exchange on November 16, 1886, its stated initial value was 238.21 points, which rose considerably in the following years. There was then a substantial rise beginning in 1884 owing to expectations about the success of indigo synthesis, and the value went up over 400 (see Figure I.8). The company then used the stock exchange value in the raising of the share capital in 1897 and 1899 with a nominal value of 3.3 million marks by imposing a premium of 250 percent, which consequently brought in 11 million marks in cash, which was deposited in the reserve funds to raise them to fully 20.8 million marks, at a time when total share capital amounted to 21 million marks. The reserves therefore helped finance the considerable investments of these years. In order to secure this stock-exchange effect, in 1899 the supervisory board was even

³⁵⁰ See the rates for the four largest coal-tar dye producers for the years 1888–1912 as reported by Redlich, *Bedeutung*, 37.

³⁵¹ AR from April 28, 1876, BASF UA, C 112.

³⁵² See AR from April 3, 29, and 30, 1885, June 24, 1885, May 8, 1891, and October 17, 1887.

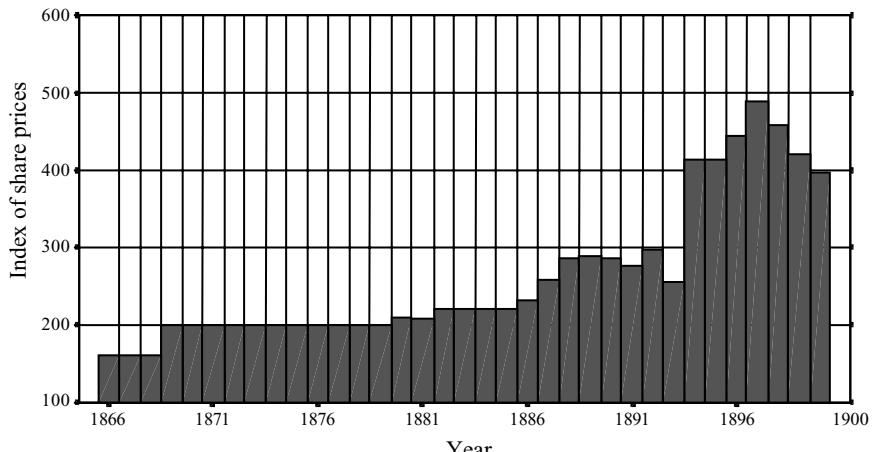


Figure I.8. Index Value of BASF Shares, 1866–1900.

willing to cut back write-offs temporarily in favor of higher dividends (24 percent).³⁵³

Both of these methods – write-offs and reserve funds – were meant to make profits seem much lower than they actually were. But more than this, they also helped in the establishment of considerable hidden reserves. “The prosperity of the business to this point,” members of the supervisory board stated retrospectively in 1899, had “most importantly been based on the fact . . . that write-offs were undertaken to such an extent that they were able to guarantee stability and steadiness in business results, and also gave the company the necessary means for the improvement and expansion of its facilities without having to increase the share capital.”³⁵⁴ BASF, moreover, was not alone in espousing this company philosophy. In the German coal-tar dye industry as a whole, the tendency was toward large-scale self-financing for the formation of capital. The steady and above average earnings of the new industrial branch made this form of financing more possible from the very beginning. The legal form of the joint-stock corporation, of course, offered comfortable possibilities for beefing up basic capital as needed. But since the stockholders (in any case a fairly small number of individuals) appear to have been more interested in a long-term capital investment than the highest possible payout of dividends at the earliest possible moment, the firm’s leadership could concentrate on the rapid expansion of the company using retained earnings. The formation of secret and open reserves via write-offs,

³⁵³ AAR from November 10, 1899, BASF UA, C 113.

³⁵⁴ AAR from November 10, 1899, BASF UA C 113.

reserve funds, various special funds,³⁵⁵ and savings of other sorts³⁵⁶ can hardly be ascertained in retrospect. But, most certainly, the amounts involved were considerable. Already in the 1882 yearly company report, the managing board remarked that during the previous ten years of fusion with Stuttgart "nearly 93 percent of the value of the share capital [had been built up in the form] of reserves and write-offs." And furthermore, "we have put these to use in the interests of the business."³⁵⁷ The yearly report of 1886, moreover, noted an efficient method of formation of reserves with the observation "that all property that has been taken out of use is written off directly at inventory value – namely without taking account of the amortization that has been taken to date according to the statutes of the firm." When BASF sold its Duisburg establishment in 1886 to Duisburger Kupferhütte for 600,000 marks, it transferred the write-offs on the property that had been taken beginning in 1876, a sum amounting to nearly half a million marks, "to the extraordinary reserve account."³⁵⁸ In this way, the corporation secured for itself the necessary room for maneuver in terms of liquidity for planning and production. Indeed, it was only in 1897 that BASF had to approach the capital market in any major way for increased capital and loans, so as to bring first indigo, and then ammonia synthesis, to industrial scale. The firm seems to have used large amounts of short-term bank credits rarely, and even then only to fund pressing projects. Thus, in 1875, a million guilders (the equivalent of 1.714 marks at the time) was borrowed from the Rheinische Kreditbank, apparently for the expansion of alizarin production.³⁵⁹

The financial strength of the German coal-tar dye industry undoubtedly contributed to the fact that attempts at wide-ranging mergers beginning in 1903 met only with limited success. At the same time, it guaranteed the self-conscious independence of the companies with regard to banks.³⁶⁰ The BASF company leadership used the services of a limited number of selected banking institutes³⁶¹ when dealing with monetary transactions and to secure short-term credits. It also used them for emissions of stocks and bonds, but otherwise sought to limit their influence. Moreover, banks were not able to exercise much influence even by representing stockholders at the

³⁵⁵ For example, for pensions for high-ranking managers and for a firm-internal savings bank. The money deposited in each of these was then used in further financing expansion of the means of production.

³⁵⁶ For example, payments to the Delcredere account, among other things in order to obtain additional finances for the expansion of the factory, was raised in 1896 to 500,000 marks. AR from April 10, 1896, BASF UA, C 112.

³⁵⁷ BASF UA, C 22. ³⁵⁸ GB 1886, BASF UA, C 22.

³⁵⁹ On this, see Engelhorn to Siegle, December 24 and 31, 1874, BASF UA, A 15/1.

³⁶⁰ See L. Brunck, *Lebenerinnerungen*, 67; Feldenkirchen, *Finanzierung*, 116–117.

³⁶¹ W.H. Ladenburg und Söhne as well as the Rheinische Creditbank in Mannheim; the Württembergische Vereinsbank in Stuttgart; and the Deutsche Vereinsbank in Frankfurt am Main.

firm's general assemblies. The bankers who were on the supervisory board of BASF, men such as the Ladenburgs, Carl Eckhard, and Kilian Steiner, were linked closely to the firm through extensive personal shareholding of their own and, insofar as can be ascertained, never tried to promote or carry through specific banking interests. They were much more (and explicitly) committed to ensuring that the company's policy of financial independence was maintained.³⁶²

The Human Factor in Production: Firm Personnel – High-Ranking Salaried Officials (“Beamte”) and Workers

Everything we have seen in this part of the book so far has pointed quite clearly to the importance of “human capital” in the founding and the leadership of the company and in the mass creation of new products and production methods, especially at the higher levels of the firm. The following overview therefore provides a brief summary of key features of the overall workforce, which was almost exclusively male.

The remarkable growth of BASF necessitated increasing differentiation and specialization of jobs within the factory. It also called forth a simultaneous delimitation of the workforce according to economic, social, and legal status, that is, between high-ranking salaried officials, or “*Beamte*,” and workers. The *Beamten*, later the highest-ranking group of salaried employees, took on ongoing tasks in the scientific, technical, and commercial areas. They were also bound to the company with long-term contracts, earned a fixed monthly salary, were awarded a share of the company's profits (although the precise amount differed depending upon the rank of the salaried employee), and could reckon with a high degree of security from the firm in the case of illness, death, and/or old age. In contrast, the workers were paid for each hour they worked on a weekly basis. Since most of them were not qualified or skilled, they were relatively easy to exchange or replace. They also tended, in contrast to the *Beamten*, to favor frequent changes of job: high rates of turnover were a major feature of this group of employees, despite a growth in the number of workers who served for a longer period of time.

Naturally, wage-earners (including masters, foremen, and other more senior workers) represented the lion's share of the BASF workforce. Their numbers grew between 1876 and 1900³⁶³ by about fivefold, from about 1,140 to 6,360. In at least relative terms, however, the growth in salary-earners during the same period – about tenfold in all – was even more impressive. Their share in the workforce as a whole thus increased from just under 3

³⁶² See, e.g., Kilian Steiner's remarks in the committee meeting of the AR from November 10, 1889, BASF UA, C 113.

³⁶³ It appears that the reported numbers are comparable to one another during this time period. See the following note.

to 5 percent. In 1876, the firm had on its books 17 (academically trained) chemists, 4 "technicians," and 13 high-ranking sales officials. By the end of 1899 BASF's "salary account" included 150 chemists, 62 technicians, and 120 salaried salesmen. This last figure, incidentally, does not include the sales force located far afield.³⁶⁴ The growing scientific basis and orientation of chemical production and the increasing importance of industrial technology are mirrored in these data, just as is the worldwide expansion of the sales system. If one adds to these figures on high-ranking salaried employees those who started out as workers, but soon were counted among the newly formed group of white-collar workers, or *Angestellten*, the proportion of the firm's workforce active in the "tertiary sector" by 1895 amounted already to 7.5 percent, a figure that rose to more than 11 percent by 1900.

A Guarantee for Continuity and Technical Competence: The High-Ranking Salaried Employees

By virtue of their key functions in organization, research, production, and sales, high-ranking salaried employees received special treatment from the company. As the numbers demonstrate, the group was not really a homogeneous block. Different areas of activity within the firm and different levels ensured variety and hierarchy. The very highest of them, for instance, occupied a privileged position by having the right to directors' fees. These men included the members of the managing board itself and those with the power to sign contracts on behalf of the company. For them, the set salary usually represented only a modest proportion of their total income.³⁶⁵ In 1899, for example, Brunck's salary amounted to 15,000 marks per year, but his director's fees amounted to 157,755 marks. In addition to 12,000 marks for basic salaries, deputy directors earned 78,878 marks each in fees. Even in the case of younger employees who had the power to sign on behalf of the company, the bulk of income came from profit sharing. It is possible to calculate an average payment from the "salary account" for the year 1899. On the basis of these calculations, chemists (excluding special allowances) earned a basic yearly salary of 3,827 marks. Technicians, on the other hand, earned 3,422, and sales personnel 2,556 marks. In this context, it should be noted that to some extent at least the relatively low level of salary for the last-named group in comparison to their better earning counterparts in the laboratory and on the shop floor might be offset through bonuses and commissions:³⁶⁶

³⁶⁴ This is reported on the basis of data in BASF UA, C 652.

³⁶⁵ The following section is based on analysis of the "Salair Conto" between 1877 and 1899 (BASF UA, C 652), and for the directors' fees, BASF UA o. Signatur: "No 2. Aufsichtsrath, Direction, Procuristen. Personalia."

³⁶⁶ In the directory of directors' fees, a sum of 182,735 marks in all is indicated for the commercial officials. If the 120 commercial Beamten were the sole recipients of this sum, it works out to an average payment of 1,500 marks per person.

after all, the other two groups of high-ranking salaried workers were also awarded special allowances.

All in all, however, the salaries of high-ranking officials at BASF were viewed as relatively good compared to those of its competitors.³⁶⁷ Naturally, though, they differed considerably according to the age, experience, and previous performance of the given employee. In 1891, for example, an exceptional salesman such as Lothar Brunck drew a basic salary of 2,400 and a bonus of 300 marks. By 1895, he was earning 4,000 in salary, along with 4,470 in commissions and bonuses³⁶⁸ before he moved on to gain the power to sign for the firm and entered a considerably higher category. Carl Bosch, who started his career at BASF in 1899 just after earning his doctorate, was paid a salary of 2,400 marks, whereas exceptional and long-serving chemists such as Knietsch and Bohn received 9,000 marks each. And in the case of chemists, their contractually secured right to bonuses or fees in relation to production as well as with regard to newly developed products could increase their salaries dramatically. The precise amount paid in this way cannot be ascertained, but it was probably considerable. After all, the bonuses paid to these people, who were crucial to the success of the firm, were supposed to spur them on to even greater performance.³⁶⁹

BASF was clearly interested in retaining its employees for a long period of time, something that is obvious from the contracts awarded to them. Initially, the members of the managing board had not only to sign contracts, but also to give their word of honor that they would adhere to them. Eventually, resistance on the part of board members ended the latter practice.³⁷⁰ Contracts for high-ranking officials were set at five years at the minimum,³⁷¹ and employees who resigned from the firm were blocked from working for a firm manufacturing similar products for several years. Moreover, violation of the contract's terms would attract a heavy fine. In return for being looked after, therefore, the employee was expected to be unconditionally loyal to the firm. When a French chemist decided to resign from his position at BASF in 1890 and the suspicion arose that he was intending to join the Manufacture Lyonnaise instead, Glaser, expressly "unpleasantly affected," commented: "We need people in our company who swear their allegiance to us, not those who look left and right for other possibilities."³⁷² Evidently, though, the overwhelming majority of the chemists who worked at BASF were willing to pledge allegiance to the firm's flag as they were expected to do. A directory of the chemists who joined the company listed 196 persons

³⁶⁷ L. Brunck, "Lebenserinnerungen," 68. ³⁶⁸ BASF UA, W 1 Lothar Brunck.

³⁶⁹ For example, Paul Julius entered the workforce at BASF in 1888 and earned 2,400 marks per year initially as well as a bonus of 500. By 1900, his salary had risen to 4,800 marks, but his directors' fees amounted now to 11,500 marks. BASF UA, W 1 Paul Julius.

³⁷⁰ AR from February 9, 1883, BASF UA, C 112. ³⁷¹ See BASF UA, C 627/2.

³⁷² April 26, 1890, BASF UA, Direkte Korrespondenz der Direktion, 36–37.

by the end of 1899. Of them, less than one-fourth stayed with the company for fewer than five years. In Engelhorn's time, however, the fluctuation was considerably greater, nearly 40 percent. This was because the company was temporarily employing university assistants on behalf of Baeyer, but also because many chemists of the time soon chose to become self-employed as an apothecary or as an entrepreneur. Or perhaps they would take advantage of good chances for promotion within other companies. Brunck's change of course in the company's research policy, however, made for noticeably higher stability. Only 15 percent of the 133 chemists who were hired by the new director between 1884 and 1899 left BASF within the initial five-year period of their employment. What is more, by far the largest proportion of those who remained dedicated themselves and their work to the Ludwigshafen firm until they retired or died.³⁷³

In any case, even by the time the "Engelhorn era" ended in 1883, the number of chemists at BASF had risen to 33 in all. After that, Brunck rapidly pursued a policy of firm-internal research, primarily through new hires, including such capable individuals as René Bohn and Rudolf Knietsch in 1884,³⁷⁴ August Bernthsen in 1887, Paul Julius in 1888, and Carl Bosch in 1899. What is more, the technical translation of new discoveries into practice as well as increasingly complicated production procedures required that the work of the "laboratory chemist" be complemented by the expertise of the "industrial chemist."³⁷⁵ By 1889, already 67 chemists were working in the laboratories and in production plants; ten years later, there were 150. In staffing the BASF research department, Caro had given preference to university students of his friend, Adolf Baeyer.³⁷⁶ By contrast, many of the younger chemists came from polytechnics (e.g., Karlsruhe or Zurich) rather than universities, with the latter characterized by strong practical orientation.³⁷⁷

Despite such differences in origin, training, and personal temperament, however, it is clear that there was a certain *esprit de corps* among chemists at the time, extending even beyond the individual firms.³⁷⁸ This spirit resulted in many ways through acquaintance and friendship from the time of university study, doctoral work, and/or assistantship to a professor, but was fed also by continuous contact in discipline-specific societies and associations. What is more, it was promoted additionally by a feeling of national superiority, especially in the field of chemistry, and from pride in the achievements of this young branch of science and its contributions to the German

³⁷³ Chemists' lists, in BASF UA, C 623.

³⁷⁴ On Knietsch in particular, see Glaser, Brunck, 21 ff; see also the short biography in Wolf, Knietsch; and NDB 12 (1980), 183–184 (H. Pfitzner).

³⁷⁵ See Caro, *Entwickelung*, 967–968.

³⁷⁶ Repeated mentions of this are in the letters of Baeyer to Caro in Wiedenmann, *Konstruktoin*, II. See also Schuster, *Wissenschaft*, 128 ff.

³⁷⁷ Schröter, Engelhorn, 177. ³⁷⁸ See, e.g., Caro, *Reden*, 64.

economy, “modern cultural progress,” and optimistic progressive ideology. What was meant by the latter was the ability to use human ingenuity to solve problems objectively, going beyond nature’s own abilities and products, but also eliminating or minimizing risks.³⁷⁹ For the chemists, to work at BASF meant to march at the forefront of such progressiveness. What is more, a similar sort of self-consciousness and self-confidence, in which national pride and pride in the firm went hand in hand with one another, is also notable in relevant comments from the circle of high-ranking commercial officials at BASF.³⁸⁰

Institutionally the firm’s group of high-ranking salaried officials was defined through the so-called *Beamten* statute, at the heart of which was the “pension scheme for *Beamten*.” It was hardly an accident that this institution came into existence only after long deliberation³⁸¹ at the beginning of 1888. At that time, the political agenda was dominated by the final stage of Bismarck’s social security system, namely invalidity and old-age insurance. It was clearly in the firm’s interest to provide their high-ranking salaried officials with similar benefits in the expectation that “the business would receive service in return for its considerable outlays.”³⁸² Consequently, the company placed 200,000 marks of savings in a general support fund “as basic capital immune from attack” for the new scheme. It also compensated for potential shortfalls, and contributed at first 6 percent, later 4 percent, of the salaries of the scheme’s members (who also contributed 4 percent) to the scheme from its own funds. In 1888, the scheme had 227 members. By the end of 1899, there were 448 members, and the scheme’s capital stood at nearly 1.7 million marks. It had payment obligations to 8 pensioners, 8 widows, and 17 children of deceased members.³⁸³

In other respects as well, the firm’s directors made special provisions for high-ranking salaried officials. A social building, or *Gesellschaftshaus*, the decoration and furnishing of which was mainly financed through donations by Gustav Siegle,³⁸⁴ was opened with a roaring party on December 14, 1900. It featured a library and reading room, and a bowling alley and dining room reserved for high-ranking salaried officials. It also had social spaces and a

³⁷⁹ Examples are in *ibid.*, 166, 169/171.

³⁸⁰ See the speeches at celebrations marking a certain number of years of service to the firm in BASF UA, A 19/1. The slogan of Robert Hüttenmüller, who served as commercial director of BASF from 1906–19, is especially telling: “Ich bin geboren, deutsch zu fühlen, Bin ganz auf deutsches Denken eingestellt, Erst kommt mein Volk, Dann all’ die andern Vielen, Erst meine Heimat, dann die Welt.” BASF UA, W 1 Hüttenmüller.

³⁸¹ VR from November 28, 1885, October 17, 1887. ³⁸² GB 1887, BASF UA, C 22.

³⁸³ This information compiled from various minutes of AR and AAR (especially October 17, 1887, October 29, 1896, and November 8, 1904) in BASF UA, C 112 and 113; VT I, 318 and 443. Documents in BASF UA, C 721 ff.

³⁸⁴ Beginning in 1897, Siegle regularly transferred his director’s fees as a member of the supervisory board for this purpose. BASF UA, Direkte Korrespondenz der Direktion.

large ballroom. The building could thus serve the “Beamten of the pension scheme” primarily as a highly desired “central point for social occasions of all sorts,” including those held by firm-internal societies for high-ranking salaried officials, such as the Friday and Wednesday clubs.³⁸⁵ A relatively large number of these officials, too, lived in company housing; in fact, nearly a quarter of them did so by 1900. At the beginning of the twentieth century, expenditures on services undertaken voluntarily by the firm for this group amounted to 420 marks per person, nearly five times the amount spent for similar purposes per worker.

The Workers and Factory Social Policy

It is not possible to ignore the fact that social assumptions about relative worth are mirrored in distinctions such as these. By far the largest number of workers in the coal-tar dye industry, after all, consisted of uneducated and unskilled workers who, without much in the way of protection, had to undertake truly hard and dirty work. Thus, young and strong men were preferred, and those who were older than 35 had no chance of being hired for the first time. The early willingness of the firm to employ at least a part-time factory doctor (starting in 1866) can be explained primarily by its desire to check out the state of health of applicants already before they entered service in the factory. Generally speaking, there were plenty of people interested in jobs at BASF. Plenty of people lived in the villages, towns, and cities in the Ludwigshafen region on both sides of the Rhine, and furthermore they frequently lived under the most primitive conditions. They thus formed a large, although fairly unstable, reservoir of labor. Those who did not like the work or just could not take it simply left the company after a few days, weeks, or at most months. This happened especially often in spring, when agriculture or construction offered more pleasant and healthier work. In the autumn, then, many came back for a half year over the winter as a seasonal workforce for the factory.³⁸⁶

Those who decided to stay in their jobs at BASF, however, could reckon with considerable workplace security. Owing to the unbridled growth of the firm, layoffs or firings because of the business cycle were practically unknown. The proportion of workers with the stamina to last at least five years thus reached about 50 percent around 1900, a truly impressive figure. On the other hand, the fluctuation of the remaining half of the workers who stayed only for a short time was extraordinarily large.³⁸⁷ For the years 1897–1899, it is possible to ascertain that for every 100 workers in a given year, there were 74 new hires and 65 who left. Purely in terms of arithmetic,

³⁸⁵ See “90 Jahre Mittwoch-Kegelgesellschaft 1901–1991,” BASF UA, C 729.

³⁸⁶ See Glaser, *Erlebnisse*, 79.

³⁸⁷ On this, the worker statistics introduced in 1896 provide important material. BASF UA, A 915/1 ff.

then, only 12 percent of those who were hired remained (i.e., 9 of 74). This posed considerable difficulties for the company, especially when new production processes were started. After all, it required a solid team of workers for continuous operation in a new working area who would gain experience over the long term, developing the necessary expertise in relevant production technologies and becoming adept at handling substances, apparatus, equipment, and machines.

The construction of workers' housing in the Hemshof area right next to the factory itself was meant to contribute to this sort of stabilizing team building. When as a consequence of an economic boom "hard-working and dependable workers [became] almost impossible to hold on to,"³⁸⁸ Engelhorn put the necessary measures in place in 1871. It became a fixed belief by the company that the solution to the housing question was essential both "for [protecting] the health of the workers and for attracting a settled and content workforce."³⁸⁹ This represented, after all, the coming together of humanitarian, economic, and political aspects of the "issue of worker housing." By providing "a comfortable home" for the worker and his family, the company sought to bind the worker to the factory more fully both inside and outside the workplace, and thus to immunize him against the trade union movement. Clearly, the intention was not to provide housing for all workers, but rather only for the desired "core of hard-working and loyal workers" (about 10 percent of the total workforce) as Brunck put it at the beginning of 1899.³⁹⁰ And even this level was hardly reached by 1900 with the total of 548 worker apartments. Those who benefited were, not surprisingly, above all craft and trade masters, foremen, and other senior workers, in other words a circle of special importance to the firm and one that had already demonstrated its loyalty to it.

At the same time, BASF did not have that many concerns about strengthened political pressure from the workforce before the turn of the twentieth century. The trade-union movement at first only gained a foothold in the chemical industry very gradually. One factor, of course, was the low level of qualification of the largest part of the workers, and another one was a largely rural local environment. After all, at least three-fourths of the workers in 1899 could be categorized as unskilled or semi-skilled. And a quarter of the workforce commuted between their homes, located around Ludwigshafen each day to work.³⁹¹ This was apparently all fine from the point of view of the firm's leadership. After all, beginning in 1899, it established a worker settlement in the Limburgerhof on what was essentially a greenfield site, and otherwise demonstrated a willingness to support those who lived outside the city with contributions toward the cost of travel.

³⁸⁸ VR from August 21, 1871, BASF UA C, 111. ³⁸⁹ BASF UA, C 704/3.

³⁹⁰ AAR from January 19, 1899, BASF UA, C 113.

³⁹¹ Estimated on the basis of the worker statistics for 1899, BASF UA, A 915/1.

The formation of collective will and solidarity of the workers was naturally also affected negatively by the strong fluctuations of a considerable proportion of the workforce that have already been mentioned. Nevertheless, the BASF's workers were not a monolith. Instead, there were noticeable and important differences within the group, conditioned by the job each member did, his qualifications, and his place in the hierarchy of the world of work. Since the individual plants within the company operated largely independently from one another, hired "their" own workers, and paid them according to individually determined hourly rates, the individual workers oriented themselves at first toward their own plant. Differences in qualifications divided the factory workforce. Whereas the construction and machine-technical department, for instance, had a large number of tradesmen from various parts of the building and metalworking trades, the production units were staffed almost exclusively by unskilled or semi-skilled workers. On top of this came the group of unskilled yard, warehouse, and transport workers.

Naturally, skilled tradesmen and specialized workmen enjoyed a higher status compared to the great mass of factory workers and thus could bring home a larger pay packet each week. The same was true for foremen. This "worker aristocracy," as the social democrats liked to call them, was for the most part composed of employees who were tried and true and loyal to the firm. They generally received, in addition to higher wages than the rest of the workers, special "compensation money" for especially difficult or burdensome work. In addition, they received bonuses amounting in 1898 to between 100 and 150 marks per person, and some of them also got free living quarters. In this way, 115 foremen in 1898 earned an average of 2,100 marks per year. The fact that the company concluded long-term contracts with them demonstrates how much it depended on this elite group.³⁹²

The average, simple worker on the other hand could only count on his daily wage, which, owing to the difficulty of the work itself, was somewhat above the local norm. At the end of the nineteenth century, this amounted to about 3.50 per day, or just over 1,000 marks per year. Still, this sum could hardly cover the needs of family, even if one was quite thrifty.³⁹³ And this was true despite the fact that the rise in wages between 1875 and 1900 exceeded by about 50 percent the rise in the cost of living. In this context, it is understandable that plant managers never had much difficulty finding people to work the somewhat better paid overtime. What is more, even within the mass of the simple workers in the factory, variation in wages was quite large according to age, length of time working for the company, and field of work.

Within the context of total running costs for the company, wages for workers constituted a category that was quite bearable. In 1872, such wages

³⁹² Examples from the early years are in BASF UA, C 623/17; an example from 1901 is in BASF UA, C 60.

³⁹³ On this, see the estimates by Breunig, *Soziale Verhältnisse*, 114 ff.

accounted for 16 percent, in 1888 19 percent, and at the end of the century just under a quarter in all. Even the latter proportion is relatively modest. The stockholders, after all, could count on higher dividend payments at least into the early 1890s. It was only starting in 1895 that these payments were overtaken increasingly by wage costs.

Authority and obedience, duty and order determined the hierarchically structured world of work. This was true for the worker, his superior, and for a larger circle with specific authority to issue orders, including “foremen, more senior workers, porters, night watchmen, and train attendants.”³⁹⁴ Discipline at the workplace began when the worker walked through the main factory gates, “passing by the porter’s rooms.” Supervision grew in tandem with the larger dimensions of the firm. Beginning in about 1890, a security service was responsible for patrolling the factory’s walls, and a porter service oversaw the two entrances to it, the “large” and the “small” gates.³⁹⁵ Those who contravened such regulations through “disobedience” or “improper” behavior had to reckon with immediate dismissal. In other cases, each side had to give a one-week notice of termination.

All employees of the firm were equal in terms of hours of work. In this respect, BASF maintained the 12-hour day in the factory until the end of 1910, although breaks for breakfast, lunch, and afternoon vespers brought total work time down to 10 hours. Employees worked from 6 to 18 hours, as calculated at the gates to the factory. Thus, the factory conformed by and large to other industries in the Palatinate. For those affected, 12 hours in the factory, together with the way to and from work, and this with a 6-day week, meant that there was scarcely any time left over beyond the minimum for recuperation of physical strength.

It was generally known that work in coal-tar dye manufacture was not exactly attractive. On the other hand, little was known about the extent to which such work was harmful to health.³⁹⁶ The responsible authorities always gave BASF good marks for its efforts in this regard, which included bathing facilities, health check-ups by the factory doctors,³⁹⁷ ventilation, safety measures on machines and apparatus, and the use of closed production systems, all in order to minimize the risks involved in chemical manufacture. The company could therefore be satisfied that it far exceeded legal norms in terms of its safety standards, even if these were obviously quite modest still. It cannot be contested, however, that there were serious dangers to health, especially in the early period of work in any given area. During this pioneer period, the possibilities of large-scale industrial manufacture had to be tried out for the first time. Possible health risks were only then – if at all – to be

³⁹⁴ On this and the following, the *Arbeitsordnungen* of 1891 and 1904 in BASF UA, C 63 1/2/1.

³⁹⁵ BASF UA, C 65/1.

³⁹⁶ See Andersen, Schrecken, and Andersen, *Technikfolgenabschätzung*, 310 ff.

³⁹⁷ See Thiess, *Arbeitsmedizin*, 4 ff.

recognized, but even then the recognition was only incomplete, especially when it involved long-term risks.³⁹⁸ Critical remarks made in this regard by the inspectorate of factories put the BASF directors in 1884 into a high state of agitation, since they saw the “social peace” as threatened by them: “Such official pronouncements in the possession of a socialist agitator constitute inestimable material for the promotion of class hatred.”³⁹⁹ The directors had, in any case, to deal ever increasingly with relevant polemic from the ranks of social democracy in the following years and decades. Franz Josef Ehrhart, the long-time leader of Ludwigshafen and palatine social democracy, led the attack with a roll of the drums in 1892 with his anti-jubilee tract “Conditions in the Badische Anilin- & Soda-Fabrik.”⁴⁰⁰ BASF never responded to such polemics on the outside, never wishing to promote discussion that might harm the image of the company. But just how unpleasant the accusations were to the directors is demonstrated by their extensive comment on Ehrhart’s brochure to the local government in Ludwigshafen.⁴⁰¹ It appears likely that they held heightened health risks to be possible. This is indicated by the precautionary measures in the workplace that they took on their own initiative and by the expansion of health care for workers. In the total spectrum of “welfare institutions,” offers for health care took on special significance.

Welfare institutions took up the largest amount of space in any of BASF’s attempts at self-portrayal at the time. They functioned in particular to maintain the firm’s image and formed, in modern terms, an important component of the BASF corporate culture. But the motivation behind “factory welfare measures” were many sided, and these were therefore controversial in contemporary discussions. The largest part of the measures undertaken served as much the interests of the company itself as those of the workforce. What is more, taken together, they were clearly (and naturally) meant to bind all employees more closely to the firm and to keep undesirable outside influences – above all from the side of social democracy – at bay to as great a degree as possible. The financial extent of such measures reached about 5 percent of the total wages of workers by the end of the nineteenth century, with those wages in turn amounting to just under one-fourth of total factory costs. In practice, they functioned as a sort of loyalty bonus, with long-term workers and their families enjoying most of the benefits.

Nevertheless, it would be unfair to men such as Brunck and Glaser to view the factory social policy that they pursued as mere disguised firm egotism,

³⁹⁸ On the problem of the concept of “poison,” which was narrowly defined at the time, see Spelsberg, Fieber, 48 ff.

³⁹⁹ BASF UA, C 622.

⁴⁰⁰ Ehrhart, *Zustände*. On the labor movement in Ludwigshafen through the end of World War I, see especially Breunig, *Soziale Verhältnisse*.

⁴⁰¹ BASF UA, A 82/1/4.

and an attempt to take the wind out of the sales of the labor movement before it reached the factory gates. After all, in contrast to Engelhorn, they demonstrated that they were consciously a part of the tradition of Christian philanthropy and charity.⁴⁰² They also exercised their feelings of social responsibility through major foundations, similarly to what Rudolph Knosp and Gustav Siegle did in Stuttgart. They operated on the assumption that there was a fundamental harmony of interests between the workers and the firm, a kind of consonance forming the basis for the social peace that they sought. They thus saw welfare measures for their own workers as a “cultural task.” The goals of social democracy were thus understandably a disastrous error for such social liberals, and this error had to be fought against and set right. “Welfare measures and institutions” were supposed to represent a possible alternative in that they improved the living arrangements of workers through construction of worker housing. They also were meant to intensify health care and prevention of illness through frequent check-ups by physicians, through longer and better insurance cover in the case of illness as was required by law,⁴⁰³ and through other measures. The latter included free visits to the doctor for family members of long-serving workers, a convalescence home for the wives of workers after they gave birth, and, in 1893, the establishment one of the world’s first sanitaria for employees suffering from tuberculosis in Dannenfels. What is more, the company sought to alleviate emergency situations in families, for instance through offering the daughters of workers free tuition in a cooking school, but also to encourage the general education of workers through a workers’ library and also to encourage thriftiness by establishing a savings association subsidized by the firm. With all of these measures, BASF did its part by establishing a higher level of standard for factory social policy, and this trend was also visible among the other large-scale chemical firms in a number of variations. From the perspective of social-democratic critics, however, this was at best just charity that helped shore up the capitalist system – which was wrong-headed and unjust – at the expense of the working class, mainly because it concealed capitalism’s fundamental problems.

Economy and Politics

We thus come once again to the political dimension of economic activity. This dimension was not at all lacking in the case of so important a company as BASF even in the early days, even if before 1900 it was considerably less important than it became in the decades that followed. This is especially true for “big” politics, in other words, politics that went beyond the region, whether one considers the free-trade efforts in the issue of customs policy or on the efforts at improving patent legislation on the national or international

⁴⁰² On Brunck, see Belitz, *Begegnung*. ⁴⁰³ See on this Meinzer, *Betriebskrankenkasse*.

level. At the same time, we should not overestimate the possibilities – and desires – for influence on the part of the firm, regardless of how tenaciously the Society for the Protection of the Interests of the German Chemical Industry may have worked as a lobby.⁴⁰⁴

On the other hand, several members of the managing and supervisory boards were active in state and Reich politics, and this was to Ludwigshafen's advantage as the initiative of August Clemm in the Bavarian state parliament for the improvement of the city's harbor facilities in 1883/84 demonstrated.⁴⁰⁵ It was actually quite self-evident that Siegle or the Clemm brothers would become involved in the National Liberal party. It was, after all, the "party for the maintenance of the Reich" catering to those with property and education, and with an expressly national agenda in the front above all else against the "ultramontanism" of the Center Party and against social democracy. It was also the pro-business defender of the principles of economic liberalism. It was just as understandable and self-evident that social democrats would attack such activities by members and former members of BASF, as they did in 1887 when Carl Clemm successfully sought local election as a member of the Imperial parliament or *Reichstag*. But it was only beginning in the early 1890s that BASF came into full view of social-democratic critique, indeed not least owing to the firm's increased "welfare efforts." After all, the social democrats recognized full well that the company sought in this way to block their own efforts to recruit members and supporters among its workforce.

The company was able to exert its influence much more directly at the local level. BASF's significance for the development of the city of Ludwigshafen can hardly be overestimated, whether in terms of increased job availability and the migration to the city because of it, land and rent prices, construction, or the location in the city of further industrial factories and businesses. At the end of the nineteenth century, it is estimated that up to one-fourth the population of Ludwigshafen earned its keep directly from the chemical firm. At least as many people again were indirectly dependent on this source of income, and the proportion gets still larger if one takes into consideration the fact that BASF drew a number of other firms into the city as its suppliers or customers. The trades and crafts as well as retail and wholesale outlets profited considerably from direct business with the company. What is more, as the largest local taxpayer, BASF had, according to Bavarian statutes with regard to local communities, a legally guaranteed right of veto in the construction of the city's budget. At the same time, the firm was active as a generous donor for the newly constructed city hospital, to whose planning the "brick general" Haueisen decisively contributed; for the establishment of a people's baths and a nursery; and for a city library for the people. It

⁴⁰⁴ See Ungewitter, Kapitel, and Beer, *Emergence*, 103 ff.

⁴⁰⁵ See newspaper articles in BASF UA, W 1 August Clemm.

also contributed to the purchase of teaching materials for the schools⁴⁰⁶ and regularly transferred small and large sums from its “discretionary fund” to churches as well as a large variety of mostly charitable societies and associations, mainly in Ludwigshafen and the Palatinate.⁴⁰⁷

Naturally, the company played a leading role in the chamber for trade and commerce (August Clemm served as its president between 1877 and 1899), and Heinrich Brunck personally was a representative on the municipal council between 1885 and 1899 with only short interruptions. The upper and middle class dominance of city politics, however, began to crumble in the 1890s. By 1899, the social democrats were able to make a decisive breakthrough in contesting the previous system of election of and by dignitaries. In the new municipal council, there were now seven rather than just one Social Democratic Party of Germany (SPD) members among 26 total delegates. Following this, Brunck declined, in spite of his reelection, to enter the council. Power relations between capital and work began to show real signs of changing, a shift that contributed to the politicization that characterized the following years and in 1906 led for the first time to strikes and worker unrest at BASF.

⁴⁰⁶ Geschichte Ludwigshafens, 131.

⁴⁰⁷ There are regular compilations of these data in the protocols of the AR, e.g., from April 6, 1900, which reports a total sum of 46,947 marks donated in 1899, BASF UA, C 112.

II

The Power of Synthesis (1900–1925)

Jeffrey Allan Johnson

I. A COMPANY IN TRANSITION

BASF at the Paris World Exposition of 1900

In 1899 the BASF accepted the invitation of the German government to participate in a collective exhibition of the German chemical industry at the Paris World Exposition of 1900. The company had been reluctant to join the others, in that there would not be enough space for an individual company display, and within the collective exhibition individual companies could not be identified.¹ How would the company find a way to bring attention to its unique attributes?

The enforced collectivity and anonymity of the German chemical industry's display at Paris extended to the official catalog, which did not contain an index connecting individual products displayed to the companies that produced them. Yet the anonymity that might have troubled a smaller competitor could hardly have been a serious disadvantage for BASF, then the world's largest manufacturer of artificial dyes. As reported by the editor of *Die chemische Industrie*, Dr. Otto N. Witt, BASF played a central role in two main sections of the display. Section I featured the products of the heavy chemical industry, among them the "epoch making advance" embodied in BASF's contact process for the direct production of concentrated sulfuric acid, which annually absorbed some 80,000 tons of pyrites. The company's role in Section VI, the artificial dyes, was even more central. The display, probably the most complete collection of synthetic dyes ever assembled, was laid out along lines suggested by BASF, that is to say by Heinrich Brunck (who had been advised by his friend Witt). Individual samples were grouped in graceful curves that brought out the underlying interconnections in their composition and thus reflected scientific principles of classification. Dominating the display was an enormous crystal bowl filled with synthetic indigo, constantly surrounded by a throng of curious onlookers, eager to see "the newest triumph of synthetic chemistry."² Even without "B.A.S.F."

¹ Sitzung des Ausschusses (Nov. 10, 1899), BASF UA, C113.

² Witt, 125, 132. Cf. Witt's eulogy for Brunck (1912), BASF UA W1: Dr. H.v. Brunck, Bd. I.

on the label, news reports like Witt's would have ensured that the educated public knew whose triumph it was. The large number of visitors also demonstrated the growing "democratization of colors," because the products of the German dye industry, with their growing range of applications, were "increasingly becoming part of everyday life." Of course these products initially reached the consumer only as characteristics and qualities of other products such as textiles, photos, or foodstuffs. Nevertheless, the growing fascination for an artificially and fashionably colored world contributed a great deal to the success of the German industry.³

As the official German catalog barred all commercial propaganda, BASF separately issued an informational brochure about the company, with a strikingly attractive, colorful cover in the art nouveau style then popular in Paris. Inside the curious reader would first encounter a brief, factual description of the company, "at present the largest establishment of its kind." To an age that read progress in numbers, BASF had impressive numbers to cite: it employed about 6,300 workers and overseers, 146 chemists, 75 engineers and technicians, and 433 commercial employees. Its 421 factory buildings in Ludwigshafen on the Rhine covered an area of 317,429 m² on a terrain of 206 hectares, over which ran a company rail network of 42.6 km including 223 turntables. The company annually consumed 243,000 tons of coal to run its 253 steam engines and eight electrical generators, 132 million kg of other raw materials, 20 million m³ of water, 12 million kg of ice, and about 12.6 million m³ of gas (for heat and light). BASF proudly mentioned its innovations in the inorganic field, especially (echoing Witt) the "epoch making" contact process for concentrated sulfuric acid and the electrolytic production of liquid chlorine, which made it possible to convert masses of raw materials into all the inorganic chemicals and reagents needed in dye production. The key components of the latter were, of course, organic raw materials and intermediates almost all obtained from coal tar distillers.⁴

There followed a long list of the company's innovations across a wide spectrum of dye groups, from alizarin to indigo. From the beginning the goal had been "the replacement of all dyestuffs found in nature and used for coloring textiles since ancient times." Thereby the industry benefited the German economy by replacing imported natural products by synthetics that could be exported (as BASF exported three-quarters of its manufactures). The total value of German dye production already exceeded 100 million marks, but the introduction of indigo had opened "a magnificent prospect" for further development: replacing the world's total output of natural indigo, 5 or 6 million kg, equivalent to 60–80 million marks. While it might take a few years to create the capacity to produce that much, "there can be no doubt

³ Andersen, *Chemie*, 93. ⁴ Badische (1900), 3–5.

about the outcome of the struggle between artificial and natural products.” Like madder, natural indigo was fated to disappear from the world’s dye markets.⁵

While BASF was justifiably proud of its technical and commercial achievements, it devoted the greater part of its brochure to a different subject: a proud, detailed depiction of the welfare services through which the company, going beyond the requirements of the law, endeavored to fulfill its “cultural duty . . . the improvement of the status of its workers and employees.”⁶ The company’s emphasis on its social policies clearly shows how difficult it still was to keep a larger core workforce in continuous employment, especially as the work was hazardous.⁷

The Paris brochure failed to mention another, darker side of the chemical industry: the question of pollution. The chemists of this period regarded the industrial release of gases and chemical effluents as unavoidable, and they thus objected to “purists . . . who demand that air and water should be kept in a condition of natural purity.”⁸ As the largest chemical plant in Germany at the turn of the century, BASF found itself repeatedly criticized for its air and water pollution. But little was done to improve the situation before World War I.⁹

Changes in Corporate Leadership Circa 1900

The BASF’s leadership entered the new century on a note of uncertainty. Following Hanser’s death, Heinrich Brunck remained the one senior director and dominant personality in the directorate (Vorstand). Brunck had old allies in the Delegation of the supervisory board (Aufsichtsrat): Carl Glaser, his friend and former co-director, as well as Kilian von Steiner, the vice chairman of the supervisory board, who had helped to broker the reorganization of the firm and its leadership during the 1880s that had brought Brunck and Glaser into the directorate. Brunck’s deputy directors for technical matters, sales, and administration were Sigmund Vischer, Adolf Kächelen, and Robert Hüttenmüller (1853–1919), who would be appointed directors with Brunck in 1903, when the senior management expanded to include two new deputy technical directors, Carl Müller and Rudolf Knietsch. Knietsch, one of Brunck’s most important colleagues in the technical direction, exemplified the unusual tradition in the BASF’s leadership – as compared to its competitors in the other dye firms – of combining scientific and technological

⁵ Badische (1900), 3–5, 8–12. ⁶ Badische (1900), 1. ⁷ Cf. Part I, Section 3 above.

⁸ Erklärung des Vorstandes der Deutschen Chemischen Gesellschaft (Jan. 30, 1906), printed in Vorschläge I, 54–5.

⁹ Andersen, *Chemie als Zukunftstechnologie*, 98–100; Andersen, *Pollution and the Chemical Industry*, 189–98. See also Part I, Section 3 above.

training, and of thereby achieving brilliant technical innovations such as the much-praised catalytic sulfuric acid process. Only a few years after the turn of the century, unfortunately, Knietsch would succumb to a fatal illness (he died in 1906). Some of the company's sales directors during this period died relatively young, which their colleagues attributed to overwork. They lacked good assistants in Ludwigshafen because they needed to send their best young associates abroad for long periods to learn firsthand the global sales network.¹⁰

At the highest level of the leadership a decisive confrontation was brewing between Brunck and August von Clemm, the chairman of the supervisory board since 1897. These two strong personalities had clashed decades earlier, when Clemm was in the directorate, but Glaser and Brunck had apparently seen Clemm as a potential ally on the supervisory board. In this they were disappointed. There is some indication that they disagreed over the proper strategy for developing indigo production, though Clemm officially supported Brunck's proposals and denied that there had been any dispute.¹¹ But open conflict broke out in 1901–03, when Clemm moved to reorganize the Delegation of the supervisory board into a smaller "select commission" and to eliminate the extra bonus (*Tantième*) previously enjoyed by members of the Delegation. Steiner strongly objected, supported by Glaser, both in turn supported by Brunck, who insisted upon additional compensation to justify the "unusual demands upon" those members of the supervisory board, like Glaser and Steiner, whose advice and cooperation Brunck had most often called upon.¹² By April 1903 the split culminated in the resignations from the supervisory board of Clemm and three of his allies (Carl Reiss, Ladenburg, and Hartogensis, all from Mannheim), after Steiner attacked them all in an open letter to the members of the supervisory board, and Glaser rallied support among the other stockholders for a change in the composition of that board.¹³ Thereafter Steiner assumed the chairmanship, only to die within the year and be replaced by C. Eckhard. Glaser became vice chairman. Clemm's departure restored a general harmony within the company's leadership. At the same time, however, it consolidated the dominant position of the Stuttgart group of stockholders related to the Siegle and Knosp families. "Any influence of the old founders had now completely disappeared," as Heinrich Brunck's nephew Lothar Brunck later recalled.¹⁴

¹⁰ Carl Glaser, *Erlebnisse und Erinnerungen nach meinem Eintritt in die Badische Anilin- & Soda-Fabrik im Jahre 1869* (unpublished manuscript, 1921; BASF UA, W1 Glaser); Glaser, Heinrich von Brunck; L. Brunck, *Lebenserinnerungen*, 28.

¹¹ Clemm to Aufsichtsrat (March 23, 1903), in BASF UA C10/2: Briefwechsel zwischen Vorstand und Aufsichtsrat 1899–1905.

¹² Brunck, Erklärung des Vorstandes (Nov. 3, 1902), in BASF UA, C10 (1899–1905)/2.

¹³ Steiner to Mitglieder des Aufsichtsrates (April 1903); Glaser to Reiss (April 19, 1903); Clemm to Vorstand (April 22, 1903), all in BASF UA, C10 (1899–1905)/2.

¹⁴ L. Brunck, *Lebenserinnerungen*, 3.

The Stuttgart group would continue to hold a controlling majority of shares in the company until the fusion that created IG Farben in 1925.¹⁵

The Victory of Synthetic Indigo

In 1900, at the festive opening of the Hofmann-Haus, the new headquarters of the Deutsche Chemische Gesellschaft, the theme chosen to commemorate the spirit of the society's first president was indigo – a fitting subject to recall August Wilhelm von Hofmann's proclamation, three decades earlier, of the "alliance of science and industry."¹⁶ The two major talks given exemplified this alliance and BASF's central role in promoting it while developing indigo: the Munich University chemistry professor Adolf von Baeyer reviewed the scientific work leading to his first complete laboratory synthesis of indigo, while Heinrich Brunck recounted the long process of transforming laboratory success into a commercially successful product.¹⁷

The initial enlargements of plant for the contact sulfuric acid process and indigo production had required substantial investments of funds, which in turn placed unusually large demands on the company's operating budget. It was no longer possible, as it had been until 1895, to cover the costs of buildings and apparatus from annual profits. Instead it became necessary to raise capital by selling more stock. In 1897 BASF had increased its share capital by a few million, enough to cover the first installations for indigo manufacture, but not the expansions undertaken in the following years. Estimates of these costs rose rapidly; by the end of 1899, however, the directors were calling for a total of 11.5 million marks for plant and 5 million for operating capital (or perhaps more, as the indigo trade presented new problems including the need for larger warehouses and "more extensive credits") – in other words, 4 million more than they had anticipated at the beginning of the year. Their assumption was that with this capital expansion BASF would be able to produce and market about 1 million kg of Indigo Pure BASF (about 20–25 percent of the world's annual production), doubling the capacity of the existing plant and adding a second "analogous factory."¹⁸ With this they planned to double the production of indigo by the end of 1902 (assuming the increased capital to be raised in 1900 and 1901 in amounts of 5 million each year, with an additional still undetermined amount of operating capital to be raised in 1902).¹⁹

The directors' capital requests evidently came as a shock to some members of the Committee of the supervisory board, who nevertheless unanimously agreed that the company's directors should energetically expand indigo

¹⁵ Aktionär-Verzeichnis (April 28, 1900) and subsequent lists in BASF UA, C111 and C112.

¹⁶ Meinel and Scholz (Hrsg.), Allianz. ¹⁷ H. Brunck, Indigo-Fabrikation, LXXI–LXXVI.

¹⁸ Sitzung des Ausschusses (Jan. 19, 1899), BASF UA, C 113.

¹⁹ Sitzung des Ausschusses (Oct. 17, 1899), BASF UA, C 113.

production, given the argument that the synthetic dye was clearly profitable and could compete effectively against the vegetable product. Just the news of BASF's vigorous expansion of production might be enough to drive many growers out of business, and in any case increased scale should increase profits as well. The only question was how to raise the capital: if not by selling stock, then through loans. In view of the long-term, permanent expansion of the business that was involved, as well as BASF's tradition of avoiding indebtedness, issuing new stock seemed the better solution, in a nominal amount of 3 million, equivalent (at 350 percent) to an effective added capital of 10.5 million.²⁰ The Committee finally agreed in November 1899 to raise 10 million marks more by loans. The stock issue as well as the loans involved negotiations with a regional financial consortium, but the company continued to avoid working with the big German investment banks.²¹ In the meantime it would be necessary to amortize the investments in new indigo plant, given that it would be two years before that new plant could be put into operation to earn profits. To ensure a dividend rate of 24 percent, the amortization rate for the new indigo plant – costing much more than new buildings of previous years – was set at 7.5 percent rather than at the customary 15 percent for other new facilities, which were also normally in operation after a much shorter delay. In the words of K. von Steiner, one of the leading members of the supervisory board, the company was “now in a transitional period,” in which reasonable requests for changes to established financial practices could be allowed in order to maintain the level of dividend payments while capital was being raised, in the expectation that future profits from indigo might even lead to higher profits as well as covering other costs.²²

In early 1900 the investments in indigo production finally seemed to be paying for themselves in additional profits: 1.4 million marks more (5 million marks) for the first six months, versus 3.6 million in the previous period. But then a combination of circumstances brought a downturn, including a decision by the French government to classify Indigo Pure BASF with the coal-tar dyes rather than, as previously, with vegetable indigo. This increased the tariff from .25 centimes to one franc, and moreover would be retroactive for a year. Protests by the company to officials in Paris and Berlin succeeded only in preventing a penalty. Further efforts to reduce the tariff proved useless.²³ In the United States BASF's synthetic indigo was eventually allowed to enter on the same basis as natural indigo, without a tariff.

²⁰ Sitzung des Ausschusses (Jan. 19, 1899).

²¹ Sitzung des Ausschusses (April 5, 1899), (Nov. 10, 1899), BASF UA, C 113; the consortium included the Rheinische Creditbank, W.H. Ladenburg u. Söhne, the Würtembergische Vereinsbank and the Deutsche Vereinsbank.

²² Sitzung des Ausschusses (Nov. 10, 1899); for amortization rates see Sitzung (April 6, 1900), BASF UA, C 113.

²³ Sitzung des Ausschusses (Oct. 17, 1900); Engere Kommission des AR, 3. Sitzung (Oct. 15, 1902), BASF UA, C 113 [all references to minutes of the Engere Kommission des AR will be from this location].

In Britain the stakes were much higher, as the bulk of vegetable indigo came from British plantations in India. BASF feared that the British government would take steps to protect its national economic interests by banning artificial indigo, so in mid-1899 the company wrote to the Foreign Office in Berlin to ask for support in the form of an official counteraction, should the British act. By September the Foreign Office did notify its ambassador in London to communicate BASF's concern to the British government.²⁴ Nevertheless evidence soon emerged that the British government was not content to remain passive. A new government contract with British dyers for woolen cloth specified "natural" vat indigo, a distinction not in the earlier version.²⁵ Nevertheless, despite some hopes that the natural dye would maintain its "superiority," many British observers soon admitted that synthetic indigo was in fact "the genuine article," chemically equivalent to the vegetable dye and thus posing a "real danger" to the prosperity of hundreds of thousands of acres of plantations.²⁶

By 1902 the indigo growers were rapidly yielding to synthetic indigo; the harvest reported in the main Calcutta region that year was little more than a third of its 1900 level, and the area planted was shrinking accordingly.²⁷ BASF was pleased to notice that buyers for vegetable indigo came only from Asia; the Europeans and Americans had already switched to the synthetic dye. Sales were once again excellent, cash reserves high (6.5 million marks), and the crisis appeared to be past. Profits in 1902 exceeded those of the previous year by 2.3 million.²⁸ Only the competition from Höchst darkened the bright horizon for indigo sales. Despite this, and despite an improved indigo harvest in 1903, BASF's leaders continued with their plans to expand production, hoping to increase profits by increasing volume, even if a drop in price would be necessary.²⁹ This made possible a steady increase in the workforce from about 6,200 at the beginning of 1900 to 7,500 (20 percent more) at the end of 1903.³⁰

New Products: Paths Taken and Not Taken

The introduction of synthetic indigo had thus come at a crucial moment for BASF. By 1900 indigo already amounted to 20 percent of BASF's total

²⁴ BASF to AA (July 25, 1899); AA to BASF (Sept. 18, 1899) (*Abschriften*), BAL, R1501, Nr. 7891, Bl. 29-33.

²⁵ BASF an Preussische Kriegsministerium, Armee-Verwaltungs-Departement (Jan. 9, 1900), with copies of British contracts, BAL, R1501, Nr. 7891, Bl. 82-92, on 86 and 90.

²⁶ Citations from Suez Customs Annual Report for 1899 (Suez, 1900); Rawson, *Cultivation*, 413-434 (here 432); *Indigo and Sugar in Behar, The Pioneer*, 124 (Feb. 28, 1901), 2; all in BAL, R1501, Nr. 7891, Bl. 144-145, 162-172RS, 180, respectively.

²⁷ Engere Kommission des AR, 3. Sitzung (Oct. 15, 1902).

²⁸ Engere Kommission des AR, 4. Sitzung (Jan. 23, 1903), 5. Sitzung (March 31, 1903).

²⁹ Engere Kommission des AR, 6. Sitzung (July 8, 1903), 7. Sitzung (Oct. 8, 1903).

³⁰ Reinhardt, *Forschung*, 365.

sales, versus 27 percent for the alizarin dyes and 45 percent for the azo and aniline dye groups³¹ (the rest mainly included some inorganic products such as sulfuric acid, generally sold from surplus not needed for internal production). Sales of these older products were contracting,³² and after August Bernthsen moved from directing the central scientific research laboratory to assume overall leadership of research and patents in 1897, the company “had no luck with its efforts to recruit first-rate organic chemists from the university,” in order to replace him. Despite the financial attraction of the position, both Carl D. Harries (Berlin) in 1898 and Johannes Thiele (Munich) in 1899 rejected BASF’s offers. Hence the company seemed unable to find the academic leadership it would have needed to undertake a new research direction. Bernthsen thus remained the official director of the main laboratory, while Paul Julius, an experienced dye chemist, took responsibility for its day-to-day management, a post he would continue to hold until 1921. Julius Abel supported Bernthsen in the Patent Department and directed its laboratory, where he specialized in the sulfur dyes.³³

The situation was beginning to look critical in 1899–1900, as both the alizarin and aniline dye departments showed significant shrinkages of income, in part due to drops in price due to the expiration of patents and consequent increased competition, in part due to increased costs of wages and materials, and finally in part due to the formation of consumers’ syndicates. Laboratory research continued to produce new dyes in a wide variety of areas that had been developed in the nineteenth century, like the azos, but the rate of return for dye research in general was falling. Of the thousands of new substances developed in the dye laboratories every year, only a few dozen reached the market, and profit margins for these had fallen.³⁴ Bernthsen publicly admitted the problem in 1903, noting that with few exceptions, “the advances of our industry today lie far less in the opening of new than in the expansion of known classes along known lines for the purpose of discovering new individual members. The rainbow may have no hue that has not already been included in the spectrum of artificial dyes. But these latter are not all equally fast . . . and not all fast colors are inexpensive and easy to produce. Precisely in these two latter directions, progress is made every day, replacing good dyes by better ones, more expensive by cheaper ones.”³⁵

As the new century opened, increased sales of indigo were only beginning partly to compensate for losses in the other dye branches. Given this situation, it was not surprising that BASF joined other producers in several conventions for alizarin red and related products. The price increases were to be kept low in order to minimize the likelihood of further increased competition, and a few smaller competitors were compensated for discontinuing

³¹ Szöllösi-Janze, Fritz Haber, 161. ³² Sitzung des Ausschusses (Jan. 19, 1899).

³³ Reinhardt, *Forschung*, 183–4; Günther, *Hauptlaboratorium*, 12.

³⁴ Johnson, *Symbiosis*, 19–21. ³⁵ Bernthsen, *Teerfarbstoffe*, 15.

production.³⁶ As a result, the alizarin market was again controlled as it had briefly been in the 1880s, but with a different result this time. The first Alizarin Convention had collapsed in 1885 after only three years of operation; the second continued into World War I. Although initially it may have produced modest profits, prices were allowed to fall until reaching a low of 1.78 marks per kilogram in 1908, ensuring the new cartel a monopoly position in this dye group. Alizarin would henceforth function as a loss leader, attracting new customers who would purchase the German companies' other, more expensive dyes as well.³⁷ Despite its problems in attracting academic leadership during this period, at this time BASF's research team nevertheless was developing some extremely promising areas in artificial dyestuffs, such as the sulfur dyes, which for a time stood third in importance after the azos and alizarins.³⁸

Opening the vat dye group, most promising of all the dye groups beyond indigo, was also a BASF achievement at the turn of the century. In January 1901 René Bohn, since the mid-1880s the leading chemist in the alizarin laboratory and one of BASF's most productive researchers in any department, reported that he had found a new substance with coloring qualities that had previously been thought unique to indigo.³⁹ The result came from a deliberate attempt to find an indigo-like substance through a reaction analogous to that developed by Heumann for the indigo synthesis. Because the raw material had been a derivative of anthraquinone, Bohn called the new blue dyestuff "Indanthrone," signifying "Indigo from anthraquinone."⁴⁰ Like indigo it was a vat dye and little sensitive to light. Even better than indigo, however, its color held fast against washing and rubbing; Bohn had synthesized "the first fast dye that does not exist in nature... With this discovery, the chemical industry finally freed itself from models provided by nature."⁴¹ Indanthrone, later marketed (with a slight change of name) as "Indanthrene Blue RS," soon had a yellow companion, "Flavanthrene," produced by the same process but at a slightly higher temperature. Bohn soon worked out the structure of Indanthrone, which was close to anthraquinone but turned out to be not much like indigo; Professor Roland Scholl, an external scientific collaborator of the BASF at the Karlsruhe College of Technology (TH), deciphered the structure of Flavanthrene, which was later marketed as "Indanthrene Yellow G." By October 1901 BASF had registered "indanthrene" as a trademark.⁴²

³⁶ Sitzungen des Ausschusses (Oct. 17, 1899, Nov. 10, 1899, Oct. 17, 1900). Cf. Haber, Chemical Industry, and Beer, Emergence.

³⁷ Beer, Emergence, 121.

³⁸ Bernthsen, *Teerfarbstoffe in neuerer Zeit*, 15–16; Günther, *Hauptlaboratorium*, 12–13; Reinhardt, *Forschung*, 178–81.

³⁹ Cited in Reinhardt, 221; on Bohn's beginnings see 213. ⁴⁰ Seefelder, *Indigo*, 57–8.

⁴¹ Wolf, *BASF: Development*, 26. ⁴² Von Nagel, *Indanthren*, 8–9, 18.

Some years later, the Höchst Farbwerke's dye chemist Benno Homolka told his mentor Adolf von Baeyer that despite the reductions in the production cost of indigo, "if it were possible however to produce indanthrene cheaply, that would mark the end of indigo! For indanthrene is the real 'King of Dyes'!"⁴³ Unfortunately indigo did not give up its crown so easily. The indanthrene dyes were difficult to market as well as expensive to produce. The yield of indanthrene was bad, that of Flavanthrene even worse. On a visit to Ludwigshafen in 1901, Baeyer's student Richard Willstätter found Bohn in his laboratory trying to improve the yield to make the process suitable for commercial production. Much later, Willstätter recalled how "Bohn had to put more effort and work into getting the last increase of yield than into the invention."⁴⁴ Two years after Willstätter's visit, Bohn's associate Christian Rampini found an important path to this goal by modifying the reaction leading to one of the intermediates, β -Aminoanthrachinon, thus reducing its cost.⁴⁵ This raised another problem, however: patenting. If BASF patented this improvement, which would finally make indanthrene commercially viable, there was every likelihood that the Swiss dye companies, at this time the major foreign competitors of the German firms, would steal the process, as Switzerland did not yet have a patent law protecting chemical processes. This would have been especially damaging in the main foreign market for indanthrene, Japan, where the process could not be protected by patent either. It was decided to forego patenting and hope to keep the improved process a secret.⁴⁶ At the marketing end, sales resistance came from the dyers' impression that the dyeing process was more complicated than with indigo and other more familiar dyes, as well as significantly different. Hence, in order to promote sales of the new vat dyes, Bohn and his colleagues had to write up booklets with precise instructions in order to train chemists and dyers in the methods required.⁴⁷ Eventually, however, as problems were resolved, BASF and its competitors were to develop a large family of indanthrene dyes.⁴⁸

BASF might have followed Bayer and Höchst into the pharmaceuticals field, but the company's leadership appears to have been skeptical about this area. Although chemically many pharmaceuticals were closely related to dyes, the research required involving medical and biological specialists as well, and the market was much more difficult to control. Whereas in the coal-tar dye field there were only a dozen or fewer significant producers (and for synthetic indigo at first only BASF and Höchst), there were hundreds or even thousands of small and large firms producing medicinal compounds.

⁴³ B. Homolka to A.v. Baeyer (Nov. 3, 1909), in Baeyer Papers (used by kind permission of Baeyer family). On Homolka see Reinhardt, *Forschung*, 259–60.

⁴⁴ Willstätter, *Aus meinem Leben*, cited in von Nagel, *Indanthren*, 9.

⁴⁵ von Nagel, *Indanthren*, 9. ⁴⁶ Reinhardt, *Forschung*, 222–3.

⁴⁷ von Nagel, *Indanthren*, 9–10. ⁴⁸ Reinhardt, *Forschung*, 224 & table, 225.

While some of these products offered large profit margins, almost all would be produced in even smaller volumes than most specialty dyes.⁴⁹ BASF's directors evidently much preferred to think in the terms of large-scale production exemplified by indigo, and to leave the small-market products to others. Hence after the formation of the first IG (the Dreibund), in 1905, they signed an agreement with Bayer, their new partners, to keep out of the pharmaceuticals business in return for Bayer's not producing indigo.⁵⁰ It is not hard to guess that BASF's directors felt they had much the better deal.

Instead of venturing into the uncertain world of pharmaceuticals, Brunck and his fellow directors in the early 1900s staked out new ground for BASF in the field of nitrogen fixation. Here was a vast potential, befitting the company that had first solved the indigo problem on a grand scale. The problem of nitrogen fixation was an old one, in which researchers by the turn of the century had achieved some modest success; but the British physical chemist William Crookes gave it a new urgency in 1898 by calling attention to the threatening situation in regard to the world's supply of Chilean nitrates and its implication for the world's food supply.⁵¹ Nitrates had long been known to be one of the three vital components of any mineral fertilizer (along with phosphates and potash).

In 1900 Wilhelm Ostwald approached BASF and several other leading chemical firms with a process he had patented for the synthesis of ammonia. Ostwald was not just thinking about the exhaustion of the Chilean nitrate deposits when he began his experiments. At a time of rising tensions between Germany and Britain associated with the British campaign against the Boers in South Africa, he was also concerned about the danger of an "unfortunate" sea war, which could cut off Germany from imports of this crucial raw material for the production of explosives. At the time, Ostwald was fascinated by the idea of catalysis, substances that accelerated chemical reactions without seeming themselves to be affected by the reaction. Ostwald's idea was to make ammonia (NH_3) by combining nitrogen (N) with hydrogen (H) under heat and pressure using an iron catalyst. He thought he had achieved this goal, and he hoped "at best" to earn 3 million marks for the process,⁵² but BASF's laboratory could not reproduce it. Ostwald was initially outraged when he heard that Rudolf Knietsch had assigned a young, newly hired employee to do the tests; disdainfully he asked, as the story goes, what else than negative results could be expected from an untried chemist who could do nothing? But the negative results stood up to extensive analysis, and further study by the young employee, who had been an assistant for Ostwald's colleague and rival in Leipzig, Johannes Wislicenus, showed that the ammonia

⁴⁹ Cf. the manufacturer and product listings in Wenzels Adressbücher, 1888 & 1912.

⁵⁰ Beer, *Emergence*, 122. ⁵¹ Haber, *Chemical Industry*, 84f.

⁵² Ostwald, *Lebenslinien*, II, 282–6.

was coming from impurities in the iron itself. In the coming years Ostwald and everyone else would hear a great deal more from that young chemist, whose name was Carl Bosch.⁵³ In the meantime, however, it appeared that synthetic ammonia was still an unreachable goal.

Instead, BASF took interest in another approach to nitrogen fixation. In 1903 a Norwegian consortium led by the engineer Sam Eyde, which was developing a process invented by Professor Kristian Birkeland in Christiana for the direct fixation of atmospheric nitrogen through oxidation by high-energy electric arc, contacted BASF's academic collaborator, Professor Otto N. Witt of the Berlin College of Technology. Witt brought Eyde in touch with BASF's directors, who were impressed by the prospects of the process and sought to negotiate a deal that would give them "decisive influence" on its technical development and application. Eyde planned to establish a corporation with a capital of 5 million Kronen in stock and another 5 million in loans; he offered BASF a share of 2 million Kronen in stock, an attractive proposition if the process worked. The key problem, however, was obtaining hydroelectric power in sufficient quantity and cheap enough to make the process commercially viable. BASF's directors subjected the figures Eyde provided them to analysis by an expert in Berlin, who concluded that the profitability of the process was uncertain. Instead of 2 million, BASF therefore offered to purchase only 200,000 Kronen worth of shares in the new nitrate company. Brunck and his colleagues also wanted a share in developing the process, for which they offered to set up a test facility in Ludwigshafen; this the consortium rejected, but BASF would not be turned aside so easily. On January 20, 1904, its directors worked out a preliminary deal with Eyde whereby BASF would obtain an exclusive license to the Birkeland process in Germany, in return for its capital investment and the payment of usage fees during the life of the patent. However, the Norwegian group did not respond immediately, putting off a planned trip by the Germans to inspect the process on-site.⁵⁴

BASF was thus poised to take a major role in nitrogen fixation, but the exact way in which it would play that role remained to be seen. It was clear, however, that embarking upon the new venture would require the company to depend upon outside expertise to a greater extent than it had since the early days of the synthetic dyes. If further development looked promising, BASF would need to recruit scientific and technical specialists in fields that were relatively unfamiliar to it, thus increasing its risk. Moreover, this new area promised to be extremely costly to develop. In view of the already considerable capital requirements for expanding indigo production, BASF's leaders were thus obliged to seek out new sources of funds and to look

⁵³ Ostwald, *Lebenslinien*, II, 279–99; Welsch, *Bemerkungen*, 77–82; Holdermann, Banne, 41–2.

⁵⁴ Engere Kommission des AR, 8. Sitzung (Dec. 16, 1903); 9. Sitzung (Feb. 12, 1904).

toward new forms of industrial concentration. They hoped in the process to avoid too much dependence upon the big German banks.⁵⁵

2. FROM THE DREIBUND TO VON BRUNCK'S DEATH (1904–1911)

The Dreibund: Concentration, Conflict, and Organizational Change

During 1903 Carl A. von Martius, co-founder, former director, and member of the supervisory board of the Aktiengesellschaft für Anilinfabrikation (Agfa) in Berlin, approached Brunck and Glaser with a proposal for a pooling agreement among the German dye companies (Interessengemeinschaft der Teerfarbenfabriken). It was not the first time he had discussed the idea with Brunck, who had never warmed to it, but this year the situation was different. The directors considered several aspects that pointed toward concentration: first, new trade and tariff policies introduced by many of the countries making up their major markets posed a potential threat to the German dye industry's dominant position and were forcing them to shift production facilities abroad. Second, the dye firms faced recent moves toward concentration at other levels of the economy with which they had to deal, including both the producers of their raw materials (for example, the Coal Syndicate and Benzene Sales Association [Benzolverkaufsvereinigung]) as well as the consumers of their dyes (such as the "powerful" British cotton printers' purchasing association).⁵⁶ In contrast, the dye industry itself suffered from "unhealthy conditions and... excessive competition," with increasing conflicts over patents. Höchst's competition in indigo, and Bayer's plans to produce it as well, especially threatened BASF's position. Hence a pooling agreement (Interessengemeinschaft or IG) seemed an attractive prospect, provided that Höchst participated.⁵⁷

The directors of Höchst were indeed interested. In September during the meeting of the Chemical Industry Association (Verein zur Wahrung der Interessen der chemischen Industrie) in Elberfeld, Gustav von Brüning, one of the directors of the Farbwerke, had discussed the prospects of a merger of the leading dye corporations with Carl Duisberg of Bayer. Both men had been impressed by the monopolistic organizations they had observed during recent trips to the United States. Encouraged by Brüning, Duisberg composed a "Memorandum on the Unification of the German Dye Factories," which in January 1904 he sent to the directors of all four principal dye corporations,

⁵⁵ Cf. L. Brunck, *Lebenserinnerungen*, 67.

⁵⁶ Engere Kommission des AR, 8. Sitzung (Dec. 16, 1903); citation from 13. Sitzung (Oct. 13, 1904).

⁵⁷ Engere Kommission des AR, 8. Sitzung (Dec. 16, 1903).

who discussed it at a preliminary meeting in Berlin. Brunck advised against inviting the fifth of the big German dye makers, Cassella, still a privately owned company. BASF's directors passed along copies to the members of the Select Commission of the supervisory board, who were all impressed by Duisberg's description of the current situation in the dye industry, which they saw as "thoroughly appropriate," but less happy with Duisberg's specific proposals for "organization and valuation." BASF's directors thereupon composed a countermemorandum representing their perspective, which they sent to Duisberg in time for the second joint meeting of corporate representatives in February 1904. In the meantime the Deutsche Bank had contacted Alfred von Kaulla of Stuttgart, one of the principal members of the supervisory board, to offer its services in facilitating a merger of the dye companies. Not wanting to bring a big bank into their affairs, the leaders of BASF asked von Kaulla not to pursue the matter.⁵⁸

Further discussions soon revealed fundamental problems, involving precisely the points BASF's Select Commission had already indicated, namely details of organization and the valuation of the various companies. Duisberg hoped to salvage the talks, but the leaders of the Höchst Farbwerke, once among the initiators of the merger idea, had now grown cold to it. In March Brüning informed Duisberg that his firm was breaking off negotiations, and Duisberg passed along the bad news to Brunck that "for the time being," they would have "to consider the efforts a failure."⁵⁹

There remained open more limited options to enhance cooperation between the main dye companies. One such option would be through conventions to regulate the market in certain products. The directors of BASF at this time took a cautious attitude to conventions, favoring them only for products with large markets (like indigo and alizarin) and relatively few, evenly matched producers, in which the continuation of an unrestricted, "ruinous" competitive struggle would be "senseless in the long run." The situation in indigo appeared to fit these criteria, as the Farbwerke in Höchst was a serious competitor; moreover, if BASF were to negotiate a favorable IG deal with other companies, it first needed to secure its profit margin by stabilizing its markets and limiting the cost of raw materials. Hence BASF's directors approached Höchst about establishing an indigo convention; they also proposed to several companies the joint purchase of a coal mine, thereby sharing the high capital costs and countering the "monopolizing tendencies of the Coal Syndicate." Höchst agreed to the indigo convention, but rejected a share in the coal mine. The indigo deal, concluded in October 1904, had an

⁵⁸ Engere Kommission des AR, 9. Sitzung (Feb. 12, 1904); *Bemerkungen zu der Denkschrift Duisbergs* (no author, no date), A16/2011; copies of Duisberg's Denkschrift in BASF UA A16/2/3, in Bayer, and also in Duisberg, *Abhandlungen; Beer, Emergence*, 124–130; Plumpe, *IG Farbenindustrie*, 45–6.

⁵⁹ Engere Kommission des AR, 10. Sitzung (April 6, 1904).

immediately positive effect on BASF's stock, which rose 8 percent as rumors circulated in the stock exchange. The Farbwerke's stock dropped 3 percent at the same time, however, suggesting that the market saw the deal as primarily to BASF's advantage.⁶⁰

BASF pursued other deals as well. After the initial IG discussions in January 1904, Franz Oppenheim of Agfa had secretly opened negotiations with BASF's directors about a possible merger between their two companies, in case the larger merger talks failed. Agfa, a considerably smaller firm with somewhat limited opportunities to expand in Berlin, wanted to build a factory along the upper Rhine that would manufacture products that Agfa currently lacked, but which would compete with those of BASF. This gave BASF reason to discuss joining forces in some form with Agfa, if only to prevent the further intensification of competition. Unfortunately, at first these talks also seemed to lead nowhere, as BASF wanted in effect to absorb Agfa, which sought in contrast a looser connection that would maintain considerable autonomy. With these negotiations stalemated, and Höchst dropping out of the coal mine deal, BASF again took up discussions with Bayer, which seemed to offer a better "fit" as the two companies' scales and product lines complemented each other well. They were exchanging recent figures on capital and profits when the unexpected news of a merger between the Farbwerke in Höchst and the hitherto excluded Cassella, aiming at a regional combine in the Rhine-Main area, gave a sudden urgency to their own merger talks.⁶¹

Although Bayer had previously wanted immediate, complete fusion, they now agreed with BASF to favor instead an IG that would pursue that goal gradually, over a longer period, while initially leaving both companies legally autonomous. BASF's directors believed that, aside from the obvious difficulties of merging two large and complex organizations, the Bayer leaders had changed their minds due to the difference of opinion between the two firms "in regard to unethical sales practices." Continuing a policy that Hanser had upheld until his death, BASF's directors were proud of taking an ethical approach. The firm's global sales organization was evidently able to make up for any lost sales this might entail through larger profits in areas where bribery was unacceptable.⁶² BASF's sales strategy stood in sharp contrast to the "practice of bribery and kickbacks" that Bayer had "adopted in grand style." BASF hoped that a merger would reduce the illicit methods that intense competition had promoted. Bayer's capital and profit figures brought, however, several unwelcome surprises for BASF. Not only did Bayer's profit

⁶⁰ L. Brunck, *Lebenserinnerungen*, 41; Engere Kommission des AR, 12. Sitzung (Oct. 6, 1904), 11. Sitzung (July 9, 1904); convention contract (BASF – Farbwerke in Höchst) on sale of synthetic indigo (no date), and Frankfurter Börsenbericht, Oct. 7, 1904, clipping; both in BASF UA, C10 (1899–1905)/2.

⁶¹ Engere Kommission des AR, 9. Sitzung (Feb. 12, 1904), 11. Sitzung (July 9, 1904), 12. Sitzung (Oct. 6, 1904).

⁶² L. Brunck, *Lebenserinnerungen*, 56–7.

margin for 1902–03 exceed theirs by 20 percent, which in itself was not surprising given BASF's problems establishing synthetic indigo and competing against Höchst; it also turned out that Bayer had not even declared all their profits, and instead had for several years secretly added to their cash reserves. Thus, given the additional influx from their recent increase in capital, Bayer's assets now exceeded those of BASF by 5 million marks. Bayer also intended to enter BASF's indigo market with their own product in the coming year. They attempted to use their profit and cash surplus as well as their indigo threat as leverage to secure a permanent advantage in the division of profits in the IG, while BASF of course insisted on full parity. The negotiations reached a critical point during the first week of October 1904, in the Dom Hotel in Cologne, in the shadow of the massive cathedral. Having concluded their convention with Höchst, BASF's leaders assumed a stronger negotiating stance against Bayer. Five days of discussions led to a compromise, whereby Bayer accepted the basis of long-term parity in an IG contract to last 50 years. In return the IG would make compensatory payments to Bayer in the amount of at least 10 million marks, spread over the first five years from the effective date of January 1, 1905.⁶³

BASF's stockholders approved the new IG through an extraordinary general meeting of the company's shareholders on November 19, 1904.⁶⁴ As BASF's negotiations with Agfa had concluded successfully in October, Heinrich Brunck now proposed to Bayer's representatives that they also invite the Berlin firm to join. The majority of Bayer's directors agreed to this over the protest of Carl Duisberg that there was little to gain from Agfa's participation.⁶⁵

While each firm would maintain independence of action in most areas under the new agreement, a managing committee with a representative from each firm would conduct routine joint business, and a joint "council of delegates" (Delegationsrat) consisting of the directors of each firm would decide on issues of major concern to all partners, such as purchases of new land or the construction of new facilities that required substantial investments. Bayer and BASF each reserved the right to veto any decision. Profits would be shared in the ratio of 14 percent to Agfa, 43 percent to each of the others.⁶⁶ In addition, joint "commissions for special affairs" were to promote

⁶³ Engere Kommission des AR, 12. Sitzung (Oct. 6, 1904); the options Bayer offered were either a payment of 10 million, or 7.5 million plus the interest on Bayer's 7 million mark loan (280,000 marks per year). BASF chose the first option; cf. Duisberg, *Lebenserinnerungen*, 92–5. On BASF's ethical stand: Hüttenmüller, "Die chemische Industrie Deutschlands, ... in der Weltwirtschaft" (Vortrag im Ausw. Amt, Dec. 13, 1912), 10–11 (BASF UA, W1 Personenarchiv (Hu-Hz); L. Brunck, *Lebenserinnerungen*, 32–40).

⁶⁴ Minutes in BASF UA, A 16/2/15.

⁶⁵ Engere Kommission des AR, 14. Sitzung (Oct. 29, 1904); Duisberg, *Lebenserinnerungen*, 91–5.

⁶⁶ *Sitzungen für den Delegationsrat der... Interessengemeinschaft* (no date), BASF UA, A 16/1/4; Duisberg, *Lebenserinnerungen*, 95–8.

cooperation and unity among the member firms in management, sales, and technical questions. In December 1904 Bayer invited the other companies' directors to visit its Leverkusen works, where Duisberg welcomed them by lauding the prospects for the IG, soon dubbed the "Dreibund" (Triple Alliance, echoing the name of the Austro-German-Italian defensive alliance then confronting the Franco-Russian Entente).⁶⁷

Among the early results of the alliance was a greater rationalization of production among the partner firms, each abandoning some product lines in favor of the most efficient producer in the group. For example, while Bayer relinquished indigo to BASF, the latter gave up the production of Diamond Black dye, a process it had only recently taken up, because Bayer could produce the same dye for 25 percent less. Yet the early going in the Dreibund was far from smooth. One of the first results of the new organization was a proposal for a joint sales corporation in the United States, which might reduce costs and losses due to competition. BASF's directors also wanted an immediate ban on "discretionary payments," that is, bribery, which was especially entrenched in North America. Both Bayer and Agfa refused, pleading "severe damages" to their sales. Bayer agreed to join when BASF agreed to a "gradual elimination" of the practice, but Agfa's directors stayed out, arguing that three separate organizations could sell more than one unified group. The two larger firms proceeded to found a joint sales company, effective January 1, 1906, with \$50,000 in capital; each firm liquidated its individual affiliates, BASF buying out Kuttroff, Pickhardt & Co. Optimistically, BASF's directors hoped that the new sales organization would exert a "favorable influence" on the sales practices of both firms' representatives.⁶⁸

The first severe test of the IG came in a different arena, however, after the three companies compared their first year's earnings. In the first meeting of the IG Council of delegates on March 30, 1905, BASF had to report the embarrassing result that its reported profits, after amortization, had fallen by nearly 5 million marks from the level of 1903; whereas those of Agfa had fallen slightly, Bayer's had increased by more than a million.⁶⁹ A few days later, at the business managers' meeting of the IG, Brunck presented what must have been a surprisingly conservative estimate of BASF's prospects for 1905. He soon had reason to regret his presentation, as both Agfa and Bayer immediately launched stinging criticisms against BASF and against Brunck himself.⁷⁰

Bayer's criticism amounted to a generalized attack on BASF for negotiating in bad faith and for alleged deficiencies in production, administration, and sales. In April 1905, in two meetings of Bayer's supervisory board, the

⁶⁷ Vortrag Prof. Dr. Duisberg in Leverkusen am 16.12.04, BASF UA, A 16/1/11.

⁶⁸ Protokoll der Aufsichtsratssitzung [Bayer]... April 28, 1905, BASF UA, A 16/1/12; Engere Kommission des AR, 15. Sitzung (March 3, 1905); 22. Sitzung (April 9, 1906).

⁶⁹ Engere Kommission des AR, 16. Sitzung (April 3, 1905).

⁷⁰ Engere Kommission des AR, 19. Sitzung (June 2, 1905).

minutes of which were sent to BASF, Carl Duisberg in particular accused BASF's directors of holding back the bad news of their firm's financial situation during the IG negotiations in 1904, and he gratuitously offered wide-ranging suggestions for improvements in Ludwigshafen's plant, for reducing its workforce, for increasing efficiency in its use of materials, and so on, and even for changing the managerial structure. Production supervisors should be given profit-sharing incentives to improve efficiency, and in the "interest of the health and the enthusiasm of the directors," department heads and younger staff members should assume more managerial responsibilities. BASF had admittedly been good enough to take up Bayer's calculation methods, but it should do more toward improving its operational accounting. Many of these suggestions were no doubt valuable, but their tone and form made them unacceptable to BASF's directors.⁷¹

Even worse to BASF's directors was that the representatives of Bayer and Agfa took advantage of this opportunity to strike back at BASF on the issue of sales policies and above all on the issue of "discretionary payments;" they targeted both Brunck and Robert Hüttemüller, one of the sales directors, who was present at the second meeting. Duisberg insisted that although Bayer agreed with the need for improvement in this area, its directors could not take responsibility for endangering the interests of their stockholders, whereas BASF had taken a "standpoint that appeared very moralistic." Other Bayer and Agfa board members joined in the critique, defending what one dismissed as "tipping." Another insisted that Agfa had only been able to achieve the success it had in America and Russia by applying these methods, which he advised BASF to adopt, as they would bring a return to profitability "even faster than through reforms in the technical area" – an area about which, admittedly, he knew nothing.⁷²

The Bayer board's request to send delegates to discuss their criticisms before BASF's supervisory board met with a flat rejection. Carl Glaser and others took particularly strong offense at the other firms' rationalizations for their questionable conduct.⁷³ A series of rather heated exchanges followed, in which BASF rejected the other companies' demands for a reworking of the IG's profit distribution quotas on the basis of the 1904 returns, arguing that this year's results were not a matter for the IG in any case. Brunck also flatly refused to consider either dissolving the IG or transforming it into a complete fusion. In mid-1905, seeing little profit in further discussion of the matter, particularly in view of a rapid improvement in BASF's sales, the leaders on both sides brought the issue to a close.⁷⁴ By the end of that year

⁷¹ Protokoll der Aufsichtsratssitzung [Bayer] ... April 28, 1905.

⁷² Protokoll der Aufsichtsratssitzung [Bayer] ... April 28, 1905, 20–22; emphasis in original.

⁷³ Protokoll der Aufsichtsratssitzung [Bayer] ... April 28, 1905; Engere Kommission des AR, 18. Sitzung (May 4, 1905).

⁷⁴ Engere Kommission des AR, 19. Sitzung, 20. Sitzung (Oct. 6, 1905).

BASF's directors could look back on total sales of 70.8 million marks, "the highest sales in the IG and simultaneously the best result in the history of our business." To von Brunck and his colleagues, these superior numbers – both of their IG partners had suffered net decreases in profits, while BASF's profits had increased by nearly 3.7 million – "demonstrate better than words the complete lack of validity of the complaints of backwardness, as well as the other related accusations against us."⁷⁵

As a man not used to disagreement and criticism, Heinrich von Brunck must have been sorely wounded by the attacks on his leadership, even though his BASF colleagues had reaffirmed their confidence in him. With the news of BASF's banner year as his final vindication, he announced his retirement as director, effective the beginning of 1907.⁷⁶ He was elected to the supervisory board and continued to take an active role in advising the directors. The early insults from his IG partners continued to rankle him, however. When in 1910 he reviewed the situation at the end of the IG's initial five-year transition period, he observed that BASF had paid out in profit sharing more than 4.85 million marks to Bayer, and nearly 2.5 million to Agfa. Recalling the critical attitudes of the "allied firms" at the beginning of the IG, he commented with evident satisfaction "that the gentlemen were now in a position to apply the same criticisms to themselves." By this time BASF's growing profitability and growing capital requirements, together with its rapidly changing plant structure and costlier apparatus, made it necessary to modify the corporate statutes in order to allow a higher rate of write-offs. Total sales reached almost 95 million marks in 1909, and gross profits exceeded 17.6 million (18.6 percent of sales). The new write-off scheme could increase write-offs by some 2.5 million marks as of the end of 1908, mostly from machinery and equipment, and thus shield more reserves from taxation.⁷⁷

Von Brunck's shift to the supervisory board punctuated a significant change in the firm's leadership. Gustav von Siegle, who had done so much to shape the company, had taken a turn for the worse in health and retired from the supervisory board in 1905.⁷⁸ A relative of the Siegle family, however, Carl Ostertag-Siegle, remained on the board. Carl Eckard, another old member, left the board when von Brunck joined and took Eckard's place as chair. Graf von Crailsheim, a Bavarian minister of state who had joined the board in 1904 after Steiner's death, became deputy chair, replacing Glaser; Crailsheim, whose connections with the Bavarian government were extremely useful to the company, would remain in this position through World War I. Similarly the academic member of the board, Carl Engler of the Karlsruhe College

⁷⁵ Engere Kommission des AR, 22. Sitzung (April 9, 1906). For the BASF's reported sales figures throughout the period, see Table 1 in Appendix.

⁷⁶ Engere Kommission des AR, Protokoll über Punkt 6... (April 9, 1906).

⁷⁷ Engere Kommission des AR, 33. Sitzung (April 1, 1910).

⁷⁸ Julie Siegle to C. Eckhard, May 8, 1905, copy in BASF UA, C10 (1899–1905)/2.

of Technology, who had joined the board following the shake-up of 1902, would remain until 1919, as would Crailsheim. Engler's academic as well as his political connections (as a member of the Reichstag for the National Liberal Party of Baden) were useful to the company.⁷⁹

On the board of directors (Vorstand), there were also several changes at the time of von Brunck's retirement. After Knietsch had died in 1906, Carl L. Müller joined Vischer as technical director, and Robert Hüttenmüller became senior director for administration and sales after the retirement of Kächelen; within a year, Vischer also retired and, like von Brunck and Kächelen, entered the supervisory board. The directorate meanwhile appointed five new deputy directors: René Bohn and August Bernthsen, whose responsibilities included dye research, development, and patent issues; Lothar Brunck (Heinrich's nephew) had been in charge of alizarin and indigo sales and now was to manage all the sales and export departments; Oscar Michel, who was responsible for the legal department (and who married Carl Glaser's daughter Luise); and then Julius Schunke, who had been manager of various aniline dye plants and most recently the triphenylmethane department. Hüttenmüller and Müller would remain the BASF's senior directors, and the rest of the new top management team would remain unchanged, working well together, until World War I. One of Müller's contributions toward a more efficient organization of the company was to eliminate the old, much-criticized requirement that communications between departments be channeled through senior management.⁸⁰ Lothar Brunck, who was often critical of his company's organization, had only positive things to recall about his fellow directors. "The BASF never *had* 'general directors'; there was no room for intrigues and jealousies. The leading personality of the time was freely conceded an authoritative position, and the directors always put the interests of the company above their personal interests."⁸¹

Cooperation among the Dreibund partners went well in some areas, such as the exchange of technical data and accounting methods. Bayer's experience in the latter area proved to be especially beneficial to BASF. The long-standing separation between the company's production (F) and sales (V) divisions, which had consequently limited their financial cooperation, had produced serious difficulties in calculating actual profitability. In retrospect, Lothar Brunck concluded that the BASF's alleged inefficiency was largely an artifact of an obsolete approach that made it practically impossible to determine the actual production cost of any product.

No one in Ludwigshafen could give a sound explanation of the unsatisfactory results [for 1904]. Nor were the accounting techniques up to date. The IG with Elberfeld

⁷⁹ Information on composition of the Vorstand and Aufsichtsrat from annual reports of the BASF; biographical information in BASF UA W1 Personenarchiv, under the various names.

⁸⁰ Bernthsen, *Fünfzig Jahre Tätigkeit*, 39. ⁸¹ L. Brunck, *Lebenserinnerungen*, 67.

gave the Badische [i.e., BASF] the first evidence of the backwardness of its own internal business organization. In manufacturing and its sales organization, the Badische was second to none... But we must unbegrudgingly acknowledge that from Elberfeld we adopted much that was good for our accounting and for the commercial organization of our plants.⁸²

Following the crisis of 1905, BASF's directors quietly discarded the old F-V calculation system, which disappeared from the annual reports to the supervisory board from 1906 on.

Sales issues nevertheless continued to produce more acrimony and disappointment for BASF's leadership. Repeated discussions by the council of delegates and the business managers produced little more than nods toward cooperation among the foreign salesforces in general, who continued to pursue their goals independently and in competition with one another, while BASF's leaders continued to condemn their partners' use of bribes. Only in the joint Bayer-BASF American sales venture did it seem possible to achieve initially at least a limited cooperation, when the two partners agreed to establish delivery quotas.⁸³ But the newly established Continental Color & Chemical Co. in New York failed to achieve the desired level of cooperation, and within a year it was dissolved. A separate American affiliate of the BASF re-emerged, led by the same agents as before, Adolf Kuttroff and Carl Pickhardt, but now under the name "Badische Company." In the meantime, efforts by Bayer and Agfa to cooperate in the Western European market had also failed, and their joint sales house was also dissolved.⁸⁴ A more lasting, albeit barely profitable joint venture was the Mersey Chemical Works near Liverpool, which the Dreibund built following the passage in 1907 of a new British law that required patents to be worked in Britain. BASF's directors brought, as usual, little enthusiasm to this project, wanting to work only those patents that "unconditionally" needed protection against termination.⁸⁵ BASF's British sales office remained in Manchester; investments in the Mersey factory were filed as "participation in foreign enterprises."⁸⁶

Without abandoning their efforts to change the sales practices of the other companies, BASF leaders put their hopes in legal reforms.⁸⁷ Hüttenmüller, as leader of the Association Against Bribery (Verein gegen das Bestechungswesen) almost from its founding, led the campaign to mobilize the political parties and public opinion for reform. In 1909, as the Reichstag began to take up the issue, Glaser also involved the other two member firms of the IG

⁸² L. Brunck, *Lebenserinnerungen*, 15.

⁸³ Engere Kommission des AR, 22. Sitzung (April 9, 1906).

⁸⁴ Engere Kommission des AR, 27. Sitzung (April 11, 1907), 28. Sitzung (Sept. 23, 1907).

⁸⁵ Reinhardt, Travis, and Heinrich Caro, 287–8; Engere Kommission des AR, 29. Sitzung (April 7, 1908), pt. 2.

⁸⁶ Engere Kommission des AR, 33. Sitzung (April 1, 1910), pt. 2.

⁸⁷ Cf. petition of Pfälzische Handels- und Gewerbekammer to Kg. Bayer. Staatsministerium des Innern (July 11, 1904), copy in BASF UA, C10 (1899–1905)/2.

in the campaign. The result was a change in the “Law to Fight Unfair Competition” that established penalties for business employees “against taking and giving bribes,” a provision that became known as the “lex Badische.” Following this success, BASF organized other Rhenish manufacturers in support of further reforms.⁸⁸ Lothar Brunck eventually took Hüttenmüller’s place in the leadership of the Association Against Bribery.

The campaign went on for years. But events abroad vindicated BASF’s approach, as by 1912 not only the British and Australians, but even several American states including New York and the key textile-producing states of New England, outlawed bribery in business. The legal storm that BASF had anticipated struck in 1913, as an American Association of Wool Manufacturers brought suits for damages against Bayer, Agfa, the Höchst Farbwerke and other German firms that engaged in what a Bayer director had once called “tipping.” Bayer was forced to shut down its tainted American affiliate and open a new one. All the big German dye firms now committed themselves to the elimination of graft in the American market, a step leading eventually to their general adoption of BASF’s standards.⁸⁹

Cooperation with the other companies continued on other levels. When BASF found itself “powerless” against the demands of raw materials’ syndicates, which had raised their prices in coal and coal-tar derivatives, the company revived the old plan for joint purchase of a coal mine, the Zeche Auguste Viktoria. Similarly the Dreibund firms agreed in 1907 on joint participation in the new power and saltpeter companies to be founded in Norway to develop the electric arc process for nitrate production. Together these projects would cost 34 million marks and were thus possible only through the joint action of the IG. Even with joint financing, BASF was forced to cover its share of the capital costs by issuing new stock, increasing its share capital from 21 to 36 million marks in 1907. In addition, in 1908 BASF issued an additional 7 million in bonds to cover the costs of a new plant and apparatus in Ludwigshafen.⁹⁰ To protect its resource base and diversify its product line, BASF was thus leading the Dreibund to expand from organic chemicals into the realm of energy and heavy chemicals.

Innovation and Marketing in Dyestuffs

As noted earlier, one of the principal factors that had inclined BASF’s directorate toward cooperation with other dye companies during this period

⁸⁸ BASF to Berlin and Elberfeld (Januar 30, 1909), Agfa to BASF and Bayer (Februar 1, 1909) in BASF UA C10 (1899–1905)/3; Engere Kommission des AR, 32. Sitzung (Oct. 11, 1909), 35. Sitzung (March 29, 1911); L. Brunck, *Lebenserinnerungen*, 39.

⁸⁹ Engere Kommission des AR, 40. Sitzung (Oct. 9, 1913), p. 3; Hüttenmüller, *Die chemische Industrie*, 10; L. Brunck, *Lebenserinnerungen*, 39.

⁹⁰ Engere Kommission des AR, 27. Sitzung (April 11, 1907), 28. Sitzung (Sept. 23, 1907), 31. Sitzung (April 2, 1909).

was the renewal of trade treaties, whereby they hoped to reduce tariffs that would otherwise make their dye exports too expensive and force them to establish production facilities abroad. This had occurred decades earlier in Russia, which had the highest rates on dye imports. Foreign patent laws that made protection conditional upon patents being worked domestically could have the same effect, as occurred in 1907 in Britain and much earlier in France. BASF's directors sought with some success to exert influence on German diplomacy so as to promote mutuality agreements that would allow BASF to continue its domestic production and thus maintain higher quality and lower prices. In this connection, Robert Hüttenmüller pointed out to the German Foreign Office in 1912 that BASF's transportation costs for a ton of dye down the Rhine and by sea to East Asia were hardly more than shipping it by rail to Berlin.⁹¹ As with other issues, BASF's directorate did not always reach agreement with the other dye companies. BASF took a much stronger stand against moving production abroad than did the others,⁹² which led them to a different policy toward tariffs on raw materials versus finished products.

Despite the lack of overall cooperation in sales, BASF did enter some sales conventions with other dye companies, including their competitors outside the Dreibund. An important case was the indigo convention with Höchst. According to the convention contract of 1904, which initially ran to the end of 1908 and was extended until 1913, both firms would sell indigo in certain types and concentrations, at prices approved by both parties (within a small range of variation). Moreover, the firms would set quotas for the amount of dyestuffs each would sell, the percentage quota of each to be based on the total amounts (in kg) each firm could sell between September 26, 1904, and December 31, 1905. Thus an initial period of fierce competition was to be followed by stability in the indigo market, as both sides (and their designated affiliates or representatives, such as Cassella in the case of Höchst) would adhere to the established prices and work together to keep out competition. Should one or the other party exceed its sales quota, provision was made to compensate the other party by having the "oversupplier" purchase from the "undersupplier" the amount of indigo that exceeded the quota for the preceding year, at the average price of the undersupplier, less 10 percent sales costs. If uneven quality in the indigo thus supplied should cause difficulties to the oversupplier in reselling it, however, the oversupplier had the right to demand additional compensation in cash. Disputes were to be settled and the contract regulated by a syndic acceptable to both sides.⁹³

⁹¹ Hüttenmüller, *Die chemische Industrie*, 6–9, 16–17. Foreign tariff and patent issues were discussed in almost every meeting of the Engere Kommission.

⁹² Duisberg remarks in *Protokoll der Aufsichtsratssitzung [Bayer]*... April 28, 1905.

⁹³ *Vertrag zwischen den Farbwerken...[Höchst]...und der Badischen Anilin- & Soda-Fabrik*... (no date), in *BASF UA, C10 (1899–1905)/2*.

During the period of competition before establishing quotas, BASF had to deal with significant disadvantages. In particular, Höchst's process was simpler and possibly cheaper, but produced equally high quality indigo. BASF, on the other hand, was burdened until 1906 with its obsolete calculation system. Worse, various methods of calculation were used, which produced different results. Finally, Höchst offered its customers the so-called “downtrend clause” (*Baisseklausel*), a contractual provision for lowering prices in case of changes in the market, which was popular in the aniline dye branch but which BASF rejected for indigo on the grounds that it would produce unacceptable losses. While wanting to get as much profit as possible from their investment in the original process, BASF's leaders were nevertheless forced to introduce a new variety, “Indigo pure B.A.S.F. G.” to compete with Höchst's new variety, Indigo MLB/T, introduced in April 1905 to great fanfare. As BASF's capacity to produce the new variation was evidently still limited, the salesforce were not to push the new type. Instead, they were to encourage customers to stay with the old one, unless customers asked for an indigo similar to Höchst's or were already taking it from Höchst. The sales division found themselves trying to calculate every deal to the last Pfennig, and, given the characteristic lack of younger staff to assist the top sales managers at the central office, the work involved became “steadily more difficult and more unpleasant.” As it turned out, despite Höchst's efforts to achieve parity, BASF still came out with the larger share of the convention's sales quotas, thanks to its superior global sales organization. But the victory had required enormous effort, thus adding another incentive for the organizational reforms that had emerged from the controversies within the IG.⁹⁴

Once the convention became established, competition between the two partners stabilized. BASF and Höchst then agreed on a new clause in the agreement, similar to one in the convention for alizarin red, which allowed major customers whose total annual consumption was divided among two or more firms, to get the same rebate as if they took their entire order from a single firm. This reflected the ongoing process of concentration in the industry, as previously independent firms had now joined in larger groups whose members had contracts with both convention partners. It appears that BASF also, albeit reluctantly, began offering a similar downtrend clause in its contracts.⁹⁵

Indigo cultivation continued to fall during this period. After a temporary recovery in 1903, the harvest contracted as prices dropped again the following year. Unfortunately, while their sales by weight rose accordingly, the price

⁹⁴ BASF to K. Rösch (Aug. 24, 1905), in BAP, Bestand BASF, B7510: Indigo-Konvention: Zirkulare, Preis-Liste (July 1907–Dec. 1911), Bl. 28–8RS; L. Brunck, *Lebenserinnerungen*, 56–7.

⁹⁵ BASF to K. Rösch (5 Okt 1909), in BAP, Bestand BASF, B7510, Bl. 123–4. The rebate required minimum annual purchases of at least 25,000 kg.

drop meant that their total profits initially continued to fall.⁹⁶ The directors were forced to report a drop in earnings of nearly 1.4 million marks in 1904, as opposed to 1903, primarily due to the “extraordinarily fierce competition” in indigo. This did not, however, prevent the company from paying its traditional dividend of 24 percent.⁹⁷ Nevertheless, the directors had to admit – at least to the Select Commission – in early 1905 that in the immediate future there was “hardly anything to expect from indigo,” and their inability to paint a rosy picture surely helped foment the previously discussed acrimonious exchanges between BASF and its partners in the IG.⁹⁸

Yet to everyone’s surprise, the business situation improved dramatically during 1905 (surprising in part, no doubt, because the convention quotas with the Höchst Farbwerke had not yet been established). As the indigo harvest continued to fall, continued improvements in the production of the synthetic product were taking effect to improve profits. BASF’s directors could take considerable satisfaction in the pattern. Based on their estimates, by 1905–6 the harvest of plantation indigo had fallen to only about 15 percent of its value in 1896–7.⁹⁹ By January 1906, the price of plantation indigo had risen to the point of being 50 percent more expensive than the synthetic product, and BASF’s sales directors could rosily predict that the high price would make it possible to quickly attract many new buyers, especially in the Persian Gulf, who had hitherto “stubbornly stuck with the natural product.”¹⁰⁰

As the reference to the Persian Gulf suggests, selling indigo required sales efforts on a global scale, perhaps even more than the other dyes, because natural indigo had been an established dye among peoples throughout Asia for centuries. There was an enormous potential market waiting in remote locations such as central China or Persia, but in the first decade of the twentieth century it was no easy task to reach that market. In one extreme case, two intrepid representatives of BASF, a salesman and a British chemist who had formerly worked for the planters, traveled across Persia by camel caravan. They brought synthetic indigo and alizarin dyes to village after village where carpets were still made according to ancient craft traditions. Each time they reached a new place, they first had to ask the local spiritual leader for permission to use their dyes, after which he would bless and purify the dyeing vats. In the hinterlands they required constant military escort for protection against gangs of robbers. Efforts like these helped to market German indigo around the world, but it was impossible to go everywhere in vast lands such

⁹⁶ Engere Kommission des AR, 15. Sitzung (March. 3, 1905).

⁹⁷ Engere Kommission des AR, 17. Sitzung (April 3, 1905).

⁹⁸ Engere Kommission des AR, 18. Sitzung (May 4, 1905).

⁹⁹ Engere Kommission des AR, 20. Sitzung (Oct. 6, 1905); these figures excluded the domestic production of indigo in China and Japan, for which there were no statistics.

¹⁰⁰ BASF to K. Rösch (Jan. 10, 1906), BAP, Bestand BASF, B7510, BI. 37–7RS.

as China, where it seemed that almost every peasant family dyed its own clothes, and the company had to depend upon native wholesaling companies. Yet because every one of those Chinese also owned at least one blue jacket dyed with indigo, China was clearly the “most promising country” for German dye exports. Synthetic indigo was beginning to displace the natural product along the coast, and after the turn of the century the Shantung railway from the German-controlled port in Tsingtao improved access to the markets of the hinterland. The directors could only devoutly hope for the fastest possible progress in the development of modern rail networks, in order to open all these remote territories to the world market.¹⁰¹

With the indigo planters almost wholly driven out of business, and the indigo market apparently won, BASF confronted an unexpected loss on the demand side. The German military authorities decided in 1907 to change the army’s standard uniform colors from the traditional indigo blue to field gray and gray-green. This left the military factories with “only a limited demand” for indigo of any kind.¹⁰² After their long, frustrating struggle to win approval from the military authorities, this must have been a major disappointment to BASF’s directors, but there was very little they could do about it other than continuing to seek new customers abroad.

The company needed to take especially aggressive measures to protect and enlarge its markets, because there now emerged new competitors in the production of synthetic indigo. Although the convention prices were to be kept low enough to discourage most potential competitors from entering the business, the first challenger arose late in 1905: the Chemische Fabrik von Heyden in Radebeul, Saxony. Together with Höchst, its convention partner, BASF proceeded forcefully against this new threat, first determining that von Heyden had not developed its own independent process, but was instead using a process on which BASF had patents pending since 1902. When the Imperial Patent Office finally issued these at the end of 1905, it was possible to take legal action against von Heyden for infringement. The Imperial Court and the Saxon State Appeals Court in Dresden both ruled in BASF’s favor in separate cases in 1908 and 1909. Although the Imperial Court’s ruling did leave a loophole allowing von Heyden to produce some indigo, the firm lacked the capacity to develop a significant alternative.¹⁰³

A more serious threat came from the Swiss, whose lack of a national patent law had long enabled them to be a thorn in the side of the German dye industry. In connection with a new trade treaty, the Swiss agreed to pass a patent law similar to the German one, which covered chemical processes;

¹⁰¹ L. Brunck, *Lebenserinnerungen*, 61–63; Hüttenmüller, *Die chemische Industrie*, 13–14; cf. Headrick, *Tools of Empire*.

¹⁰² BASF to K. Rösch (Aug 3, 1907), in BAP, Bestand BASF, B7510, Bl. 59–9RS.

¹⁰³ Engere Kommission des AR, 20. Sitzung (Oct. 6, 1905), 21. Sitzung (Dec. 20, 1905); BASF to K. Rösch (Sept 28, 07, Dec. 16, 08, April 19, 1909, Aug. 10, 1910), all in BAP, Bestand BASF, B7510, Bl. 61–1RS, 97–7RS, 107–7RS, 186–6RS, respectively.

unfortunately, BASF's directors judged the protection from this new law in 1909 to be "practically illusory."¹⁰⁴ Thus the Swiss companies could continue to compete with little hindrance. Hence when after two years of preparation the Gesellschaft für Chemische Industrie, Basel (later Ciba), seemed likely to produce some indigo in 1910, BASF mobilized its salesforces for strong pre-emptive measures. Representatives in several countries were instructed to eliminate the downtrend clause in all sales contracts, so as to prevent an outside competitor, even one who could not produce large quantities of product, from "spoiling the prices." In return for dropping the downtrend clause, all customers, old and new, would be offered the same advantages, including a low price as well as various rebates, if they would commit to contracts of at least four years. Sales agents were not to worry much about customers who threatened to defect over the elimination of the downtrend clause; after all, the convention had "means for reprisals . . . because the customers are dependent on us." Hence the sellers were to warn customers against defection, leaving them no doubt that they would not get favorable terms if they left for the competition and then tried to come back "if the competition leaves them in the lurch." Stubborn customers should be advised that the convention would stick to the literal terms of the contract, giving it "the right . . . if necessary, to renounce (the contract) from one delivery to the next." Thus, "If the competition cannot make its deliveries, the customer might find himself in a bad way."¹⁰⁵

To further discourage customers from going over to Basel or Heyden, in 1911 the convention announced "a significant price reduction" (of various amounts, in proportion to the size of orders), provided that customers would agree to cover their entire needs for the next four years "with no interim purchases from others." Most customers appear to have agreed to contracts on these terms. Basel had announced the beginning of production, but apparently was having difficulties making its first shipments in Italy and France. For prodigal customers who had signed on with that company and then, disappointed, tried to return, the convention's forgiveness would come at a price. It would cut off all deliveries until they could prove themselves "free from Basel."¹⁰⁶ BASF could afford to reduce the convention prices because they led to increased sales, while further improvements in manufacturing efficiency almost nearly kept pace with the reductions. Nevertheless, the Basel competition refused to disappear and at the beginning of 1912 finally began to ship larger quantities of indigo.¹⁰⁷

¹⁰⁴ Engere Kommission des AR, 31. Sitzung (April 2, 1909).

¹⁰⁵ BASF to K. Rösch, (April 22, 1910 and May 3, 1910), BAP, Bestand BASF, B7510, BI. 144-7RS, 166-70.

¹⁰⁶ BASF to K. Rösch (Jan. 14, 1911 [various versions], Aug 10, 1911), BAP, Bestand BASF, B7510, BI. 192-4RS, 196-8RS, 199-201, 224-5RS.

¹⁰⁷ Engere Kommission des AR, 37. Sitzung (March 30, 1912).

In the other dyes, the period opened with a rather dismal sales picture. Despite the establishment of a new alizarin convention at the turn of the century, the alizarin area showed continued drops in profits during 1904. Falling prices for aniline dyes kept profits down in this area as well, despite increased sales.¹⁰⁸ The most promising branch within the alizarin group was the indanthrene or vat dyes, but despite the many new dyes invented in this class, the indanthrenes were still too difficult to use in the early 1900s and sales remained sluggish. Hence as Höchst also began to develop the indanthrenes, BASF moved to reduce competition in regard to these dyes and related materials. Negotiations with the Höchst-Cassella group produced an agreement in June 1905 to share all patents in areas related to a highly promising new product, “Rongalit,” a hydrosulfite-reducing agent that remained stable enough to market (as previous substances in its class did not) and would make possible commercially successful dyeing with the indanthrenes. This was a critical innovation, first marketed by BASF in 1906, which reduced customer resistance and made it easier to market the rapidly growing number of indanthrene dyes over the next half-decade.¹⁰⁹

Innovation and Academic-Industrial Collaboration: From Dye Chemistry To Nitrates

BASF continued to maintain high-quality research in dye chemistry during this period, but the nature of its innovations was changing. Solving technical and commercial problems in production required far more effort and attention than the relatively simple process of producing new dye compounds in the laboratory. The company sought to recruit the best-qualified chemists and other academically trained staff, but they were not always easy to find. Perhaps as a result of increasingly negative public perceptions about career opportunities, from 1903 to 1911 enrollments of chemistry students in the German universities declined steadily.¹¹⁰ BASF’s staff of chemists nevertheless continued to grow, from about 150 at the turn of the century to about 250 at the end of 1911, including chemists in affiliates and overseas sales positions. Their work continued to produce an increasing number of patents during this period, but the emphasis significantly changed: the azos, aniline dyes, sulfur dyes, and after 1909 even indigo produced fewer patents. Dyeing and pressing processes, on the other hand, and the alizarin dye group above

¹⁰⁸ Engere Kommission des AR, 17. Sitzung (April 3, 1905).

¹⁰⁹ BAP, Bestand BASF, B7629/1: Rongalit-Konvention, Allgemeiner Vertrag (Sept. 1905–Jan. 1925), Vertrag zw. BASF, Cassella, & Höchst (June 14, 1905), BI. 40; L.F. Haber, *The Chemical Industry*, 125n, 130.

¹¹⁰ See O. Wenzel’s remarks in *Die chemische Industrie*, 29 (1906), 530–1; *Preussische Statistik*, 236 (1913), 79, 90–9.

all produced steady increases, mainly among the indanthrenes; by 1912 there were "no less than 182 dyes of this class."¹¹¹

A new area for increasing patent activity during this period was inorganic products, especially nitrates, which appear also to account for an increasing proportion of patents obtained from outside the firm after 1906 (in a couple of years, externally obtained patents came to about 30 percent of the total). This reflected BASF's lack of internal expertise in this area, and the need to rely on academic physical chemists such as Fritz Haber.¹¹² Following a long period of relative inactivity in nitrates, BASF again began to deal with the Norwegian consortium in 1905. In November von Brunck and Knietsch encountered Eyde and Birkeland again at the festive opening of Otto N. Witt's new Institute for Technical Chemistry at the Berlin College of Technology. Witt spoke on the problem of nitrogen fixation, with special reference to the Norwegians' work on the arc process, and echoed earlier warnings that the supply of Chilean nitrates would be exhausted within 20 years. Based on the judgment of a French company that evaluated the Birkeland-Eyde pilot plant, BASF's directors were persuaded that the process could be profitably worked in Norway. Moreover, they expected even better efficiency from their own version of the arc furnace, which the chemist Otto Schönherr and engineer J. Hessberger developed, and which BASF began working experimentally on a smaller scale in the summer of 1905. They therefore agreed to cooperate with the Norwegian group to build a plant in Norway, while at the same time they began to look around for suitable sources of cheap waterpower in the German and Austrian Alps. "In view of the enormous significance of this issue, especially for agriculture and the military (salt peter imports to Germany amount to 120 million marks), we hope for extensive subsidies from the government," or so BASF's directors believed at the end of 1905.¹¹³ The "extensive subsidies" would arrive, but 10 years later, under very different circumstances and for a very different project.

By this time BASF was already examining a promising alternative: the synthesis of ammonia under extreme heat and pressure using a metal catalyst, then being developed by Fritz Haber at Karlsruhe. Haber's senior colleague Carl Engler, the professor on BASF's supervisory board, had made von Brunck aware of Haber's work in April 1907. At von Brunck's request, BASF now began to support Haber, signing contracts with him a year later in connection with both the arc process and the ammonia synthesis.¹¹⁴ Von

¹¹¹ L.F. Haber, *The Chemical Industry*, 17, 130. Numbers of chemists rounded from Reinhardt, *Forschung*, 365, and BASF UA, C623ü3. For patent numbers: Reinhardt, 174, 178, 208, 225, 238, 242.

¹¹² Reinhardt, *Forschung*, 236–8.

¹¹³ Engere Kommission des AR, 21. Sitzung (Dec. 20, 1905); Witt, *Institut*, 10–16.

¹¹⁴ For Haber's life: Szöllösi-Janze, Fritz Haber, and Stoltzenberg, Fritz Haber; on Engler's role and the initial contracts with Haber: Szöllösi-Janze, 171–5.

Brunck, accompanied by Bernthsen and Bosch, had met Haber in Karlsruhe and came away impressed, despite the somewhat frightening news that the ammonia synthesis would have to run at temperatures and pressures that were as yet unknown in the chemical industry. But the technically trained Bosch, knowing the capabilities of the German steel industry, had argued that BASF should take the risk. Nevertheless the company's senior scientists initially expected little from the Haber process, which Bernthsen then viewed as "technically... hopeless" – a view perhaps derived in part from his friend Otto N. Witt's enthusiasm for the electric arc process.¹¹⁵ Hence BASF undertook a final effort to achieve success with that approach.

Although a project to use waterpower from Bavarian alpine rivers came to nothing,¹¹⁶ the Norwegian deal had achieved some initial successes. In the fall of 1907 BASF began producing nitrates at an experimental plant in Christianssand in southern Norway, and by 1909, in cooperation with its Dreibund partners, was participating in the Norwegian-French group's company Norsk Hydro in operating its plant in Notodden. BASF pressured the Norwegians to use the Schönherr furnace, which did not perform on a large scale as well as it had promised when tested on a smaller scale. As frictions developed between the two groups and the Norwegians expressed dissatisfaction with the German technology, it was decided to settle differences by comparative tests conducted under scientific supervision.

In an effort to perfect the arc process BASF had in April 1909 hired a physicist, Jonathan Zenneck, then director of the Institute for Physics at the Braunschweig College of Technology, to lead the company's first physics laboratory. He spent more than a year on-site in Norway, where one of his principal tasks was to provide precise measurements of the energy yields in the pilot plants, and to make careful comparisons between the different types of arc furnaces and circuit controls. The tests, however, "ended inconclusively and engendered much acrimony."¹¹⁷ All efforts by one of Haber's students to improve the process also failed.¹¹⁸ During 1911, meanwhile, there were promising improvements in the development of the Haber-Bosch ammonia synthesis, combined with continuing frictions with the Norwegian group, which were further complicated by changes and uncertainties in Norwegian politics, producing hostility against the influence of foreign investors. Finally, there had been an unexpected drop in the price of imported Chile

¹¹⁵ Bernthsen, *Fünfzig Jahre Tätigkeit*, 52; for his relations to Witt see Bernthsen and Brunck, *Korrespondenz mit Otto N. Witt (1899) 1902–1915*, in BASF UA, W1: H.v. Brunck, Bd. I; Szöllösi-Janze, 171, 176, 179; Holdermann, *Banne*, 69 (describes the meeting in Karlsruhe but does not date it).

¹¹⁶ Engere Kommission des AR, 32. Sitzung (Oct. 11, 1909).

¹¹⁷ Dieminger and Zenneck, *Deutsches Museum*, 13–16; Zenneck, *Erinnerungen an meine Tätigkeit in Norwegen*, typescript (hand-dated June 1940); both in BASF UA W1: Zenneck file; quote from L.F. Haber, *Chemical Industry*, 87.

¹¹⁸ Szöllösi-Janze, *Fritz Haber*, 170–5.

salt peter, which further limited the commercial prospects for the arc process. All these factors led BASF's directors to sell out their interests in Norsk Hydro.¹¹⁹ Zenneck returned to academic life.

Zenneck had entered BASF shortly before Fritz Haber finally provided a nearly futile, but ultimately crucial demonstration of the ammonia synthesis, which he and his co-worker Robert le Rossignol had now perfected on a laboratory scale. On July 1, 1909, Bosch and his catalysis expert Alwin Mittasch appeared with their mechanic in Haber's laboratory at Karlsruhe, but the process initially refused to work and Bosch left in some disgust, no doubt recalling his previous disappointment with Ostwald. Mittasch remained, however, and on July 2 was "rewarded when the apparatus delivered 100 cubic centimeters of ammonia."¹²⁰ BASF's leaders now gave more credence to Haber's process; they filed appropriate patents, worked out a royalty agreement with Haber, and assigned Bosch's team to scale up the process.¹²¹ Haber's work clearly demonstrated that significant new technologies, which could move the dye industry in new directions, could emerge from academic-style research in physical and inorganic chemistry. This in turn suggested the value of extending into these fields the pattern of academic-industrial symbiosis that had been so successful in organic chemistry.

Along with the other leading dye firms, BASF therefore played a leading, though at first rather reluctant role in expanding the scope of industrial patronage for academic chemistry. Three prominent academics, the organic chemist Emil Fischer and the physical chemists Wilhelm Ostwald and Walther Nernst, had in 1905 proposed the establishment of an Imperial Chemical Institute (Chemische Reichsanstalt) similar to the existing Imperial Institute for Physics and Technology (Physikalisch-Technische Reichsanstalt or PTR). The PTR had been established in 1887 with the support of an important industrial patron, Werner von Siemens, who had contributed land worth half a million marks. The chemists now asked for similar patronage in capital from the science-oriented chemical industry. Long, frustrating negotiations with the Imperial government ensued, which substantially altered the original form of the plan and produced, instead of a one-time contribution from industry, the formation of a permanent funding organization in which industry would carry the main share of expenses of the expected national research institute. The academic chemists justified this as a long-term investment in "free research," or what would later be called basic research, and

¹¹⁹ Vorstand to Aufsichtsrat (September 26, 1911), BASF UA C10 (1906–1913)/3; BASF could not, however, immediately recover its investments, due to agreements that apparently called for the stock to be held until 1915; in the spring of 1914 the directors had still not been able to sell it: Engere Kommission des AR, 41. Sitzung (April 1, 1914).

¹²⁰ Szöllösi-Janze, Fritz Haber, 175–181; Stoltzenberg, Fritz Haber, 159–163; quote from Travis, High Pressure, 7.

¹²¹ Cf. Szöllösi-Janze, Fritz Haber, 155–95.

the organization was set up so that the biggest contributors had the biggest influence on the administrative board. The idea had its attractions, particularly as the new organization was to include first-rate specialists in both organic and physical chemistry: one already the source of many industrial innovations, and the other, a potential source of many more, which BASF hoped to exploit. The Imperial Institute was also expected to serve as “court of arbitration and agency for expert testimony” in controversial cases such as the testing of synthetic indigo. The initial planning discussions also proposed including environmental issues among the institute’s potential areas of expertise.¹²² Von Brunck thus served as chairman of the administrative board of the funding association, the Imperial Chemical Institute Association, on its creation in 1908.

After the plan for an Imperial Institute was merged into the newly established Kaiser Wilhelm Society for the Advancement of the Sciences (Kaiser Wilhelm-Gesellschaft zur Förderung der Wissenschaften, predecessor of today’s Max Planck Society), von Brunck was similarly elected to lead the first administrative board of the Kaiser Wilhelm Institute for Chemistry in October 1911, shortly before his death. The new approach to funding an academic research institution, whereby the industry would commit itself to annual support for an indefinite period, had initially encountered skepticism; BASF’s legal division (under Michel) argued “that it is actually not legally permissible for a joint-stock company to enter into obligations of this type for such a long period, all the more as we can hardly expect equivalent benefits from them.” They nevertheless decided to participate in deference to “prominent scientific authorities,” especially Fischer.¹²³ This decision came before the project split into two separate chemical institutes under the Kaiser Wilhelm Society. BASF did not formally support the second, the KWI for Physical Chemistry and Electrochemistry. Yet its director was Fritz Haber, whose synthetic ammonia process was going to produce more than its share of “equivalent benefits” for the company’s previous investment in his work. In any case, the chemical industry’s funding organization, first led by von Brunck, set an important precedent for future joint industrial support of academic science in Germany.¹²⁴

Workers’ and Employees’ Movements

Under von Brunck’s leadership, BASF had long prided itself on its enlightened policies toward its salaried employees and workers. A comparison of its 1905 wage levels and benefits with those of its partners in the Dreibund produced results that must have been very satisfying to von Brunck: his

¹²² Vorschläge I, 13, 15, 40–1.

¹²³ Enclosure in von Brunck to Duisberg (Feb. 24, 1908), in: Bayer 46/6: Verein Chemische Reichsanstalt and Begründung einer Chemischen Reichsanstalt.

¹²⁴ Johnson, *The Kaiser’s Chemists*, 97; Johnson, *Academic-Industrial Symbiosis*.

company had the highest average wages, as well as some of the most extensive welfare benefits, whereas Agfa was last in both categories. Yet when von Crailsheim, as supervisory board member, proposed the establishment of a workers' committee to mediate grievances and thus improve employee relations on the model of the Bavarian state railroad administration, von Brunck and his fellow directors were initially skeptical and argued that the firm's organization was too complex and its wage system unsuitable. The directors preferred to consider the directors of the health insurance office as the representatives of the workers.¹²⁵

Within a few months, an unexpected strike forced the directors to reconsider their objections to workers' committees. Previous efforts by labor organizers in BASF had brought little success, and the management refused to accept collective bargaining on wage contracts, firing those who made such demands. On January 25, 1906, however, workers in the Acids Plant submitted a petition for a wage increase of 25 percent (from 3.20 to 4.00 marks per day). In this factory, where the working conditions were "especially unhealthy and difficult," the union had already organized the majority of the workers.¹²⁶ Dismissal of the spokesmen produced an immediate work stoppage in the plant, and on the following day labor organizers stepped in to mobilize about 3,000 workers to support a more moderate increase of 15 percent. By January 28 the strike had spread to the indigo plant and two others, with sympathy strikes threatened in 20 more departments.¹²⁷ The strike committee acted in a "considered and correct" way, and it was able to exploit the fact that BASF's wage levels had recently fallen "considerably behind" its competitors – a situation that even drew criticism from middle-class newspapers.¹²⁸ Concerned about avoiding disruptions in indigo shipments,¹²⁹ the directors quickly moved to achieve a compromise settlement. Workers who accepted the company's offer of a 10 percent wage increase (versus the 5 percent originally offered) and guaranteed overtime payments could return without penalty. The directors then refused further negotiations with the trade unions, and they appointed their senior engineer, Haueisen, to head the company's first commission for labor relations. To forestall the influence of outside organizers, BASF's management decided that workers' committees might, after all, have a "calming and mediating influence on our workforce," provided that they could get "calm and sober minded elements . . . who can form a counterweight against the organizations." This they hoped to attain by adopting the provisions of a recent Prussian law, which restricted voting to workers who were older and had been with the company a year or more.¹³⁰

¹²⁵ Engere Kommission des AR, 20. Sitzung (Oct. 6, 1905).

¹²⁶ Breunig, *Soziale Verhältnisse*, 467. ¹²⁷ Braun, *SchichtWechsel*, 43–4.

¹²⁸ Breunig, *Soziale Verhältnisse*, 469, 472.

¹²⁹ Cf. circular message of BASF (Jan. 31, 1906), BASF UA, C19/1.

¹³⁰ Engere Kommission des AR, 22. Sitzung (April 9, 1906); VT, *Der Mensch in der BASF*, 382–3, BASF UA.

The elections in 1906 nevertheless gave representatives of the “free” (social democratic) trade unions control of the new Workers Committee of BASF – but to little purpose. Members had no protection against dismissal, and management allocated to them only one function: to uphold the work rules (*Arbeitsordnung*). In August 1906 the committee dissolved itself in protest, to the relief of BASF’s managers, who did not schedule new elections. There would not be another workers’ committee at BASF until World War I.¹³¹

The directors then announced that they were prepared to shut down the entire company’s operations in case of another strike. Nevertheless, in 1907 the Social-Democratic unions again tried to promote a wage movement and demanded the right to represent BASF’s workers in collective bargaining; BASF’s directors refused to negotiate or to accept mediation by the local commercial court (Gewerbegericht), but Hüttenmüller suggested that the wage demands be submitted instead through the company’s health insurance board, in which two-thirds of the members were workers and one-third representatives of management. After unsuccessfully appealing to the Pfalz district governor to intervene, the union organizers ultimately had to concede defeat, advising BASF’s workers against a strike.¹³² For the next few years, labor-management relations in the company remained relatively calm, while the directors gradually extended fringe benefits and paternalistically granted wage increases that they hoped would counter the effect of inflation while keeping the unions out. The increased benefits served, of course, primarily as an incentive to loyalty. For example, the one-week paid vacations introduced in 1908 went only to workers who had 10 years of continuous service with the company.¹³³

Relatively poor economic conditions in the chemical industry following a recession beginning in 1907 temporarily weakened the unions, but BASF’s management had to confront a second workers’ strike in 1911. This time they were better prepared to confront the “hostile and untrue” criticisms by the trade unions of a seemingly beneficial reduction in work hours in January, which was supposed to allow more time away from work for commuters (somewhat less than half the workforce). The company had coupled this beneficial provision with an irritating change in the way time on the job was to be calculated. No longer would work time begin at the factory gate, but only when the worker reached his job station. By refusing even to negotiate with the workers’ health insurance committee on this matter, the directors

¹³¹ Braun, *SchichtWechsel*, 44–45.

¹³² Engere Kommission des AR, 27. Sitzung (April 11, 1907), 11; 28. Sitzung (September 23, 1907), 16; VT, Mensch, 383.

¹³³ An unsere Arbeiter! (Direktion der BASF, Dezember 31, 1907), reprod. in Braun, *SchichtWechsel*, 46. Engere Kommission des AR, 33. Sitzung (April 1, 1910), pt. 6; wage table in VT, Mensch.

opened the way to a new strike. Concluding that the unions were preparing for a decisive power struggle, BASF's directorate took pre-emptive action against the "terrorism of the unions" by establishing a "yellow" company union in June. Recognizing the implications of the new Workers Association of BASF, the social democratic Factory Workers Union (Fabrikarbeiterverband) countered two weeks later with a strike demanding a 10 percent wage increase, but the other unions withheld support and the management flatly refused to negotiate. With no more than about 2,200 of BASF's 8,000 workers on strike at any time, the directors were able to keep the key parts of the plant running with the help of substitutes and strikebreakers. After 10 weeks, the organizers conceded defeat, and the strikers returned, less 300 of their fellows purged as ringleaders.¹³⁴

The Workers Association rapidly grew to about 3,300 (by 1914 5,600) regular members, including foremen, and factory officials supervisors, and even directors as associates – but excluding, for the first two years, workers who had taken part in the strike. To aid the Association in promoting patriotism and corporate loyalty, and to help assist needy members, the company paid it 25 marks per regular member per year. At the initial, company-sponsored festival on the Limburgerhof in September 1911, BASF's management announced plans to build a workers' social center, the Association House, later called the After Hours House (Feierabendhaus). As part of this anti-socialist cultural offensive, which included the creation of company-sponsored musical and theater groups, the Association launched its own newspaper, the *Vereinsblatt* (later *Werkzeitung*), in April 1913, to coincide with the opening of the new center.¹³⁵ This strategy supplemented the company's travel subsidy for its growing number of commuters from rural areas (about 40 percent of the workforce by 1913). These workers were to be kept away from the "free" unions and social-democratic organizations as well as their class-conscious cultural facilities (workers' pubs, self-help groups, proletarian singing groups, and so on), which they might otherwise encounter in the rather gloomy but fast-growing city of Ludwigshafen. The high profits in the boom years 1911–12 also made possible two wage raises, which the management ascribed to the persuasion of the Workers Association rather than to the threat of strikes by the unions. These measures evidently had positive effects on the stability of the workforce, whose turnover rate fell below 25 percent during these years.¹³⁶

¹³⁴ Engere Kommission des AR, 35. Sitzung (March 29, 1911); VT, Mensch, 383–4; Schiffmann, Revolution, 64–6; Breunig, Soziale Verhältnisse, 486–501.

¹³⁵ Engere Kommission des AR, 36. Sitzung (Oct. 17, 1911); Was will das Vereinsblatt? and Die Einweihung des Vereinshauses, *Vereinsblatt*, 1, Nr. 1 (April 1913), 1–7; Die Vereine in der Anilinfabrik, *Vereinsblatt*, 1, Nr. 2 (May 1913), 3–5; Schiffmann, Revolution, 66–8.

¹³⁶ Braun, SchichtWechsel, 32–6; Patton, Flammable Material, 52–3, 63. On the general cultural context see Lees, Cities, esp. ch. 9.

During this period, a parallel movement began to emerge among technical employees and some younger chemists and engineers. These saw threats to their status and opportunities for advancement in the increased routinization of industrial research and growing concentration of big industry on the one hand, and in the growing power of trade unions on the other. The movement emerged in Berlin in 1904 and quickly attracted widespread interest as it demanded various reforms in patent law and the commercial code. With allegations of unusually low salaries and claims of intellectual sterility, such as that chemists were being treated like “cogs in a machine,” in 1906–07 the League of Technical and Industrial Officials (Bund der technisch-industriellen Beamten or Butib) began to attract some industrial chemists as members. There was some danger not only of political action by the left-liberal coalition in the Reichstag, but also that Butib would develop into a professional trade union, with all that this implied: collective bargaining and strikes. BASF’s chemists and technicians appear not to have played a significant role in these debates. Their officials’ salaries and economic circumstances were “probably always better” than those of the other dye firms.¹³⁷

Nevertheless some changes did occur at BASF, in particular, the expansion of fringe benefits for various officials and employees. In 1908 the foremen, supervisors, and masters received the status of salaried employees.¹³⁸ Moreover, in May 1910 the company authorized the creation of a new Association of Employees of BASF, which soon had more than 1,000 members, though only members under the age of 32 could join.¹³⁹ This was, of course, the group most likely to join the more reformist employees’ movement.

The End of the von Brunck Era

By the end of 1911, BASF had sales in excess of 100 million marks, the first dye company to reach this level. In fact, its sales of more than 105 million were 8 million higher than Bayer’s, and its profit rate was significantly higher at 23 percent, despite a strike that had cost the company 550,000 marks.¹⁴⁰ The long, costly, often frustrating years developing indigo were finally paying off, and the company was poised to develop an area of much greater potential in synthetic ammonia. In this moment of triumph, Heinrich von Brunck’s death in December 1911 deprived the company of a powerful personality who had shaped much of its development for 30 years. His old friend Carl

¹³⁷ L. Brunck, *Lebenserinnerungen*, 67. On the Butib and professionalization in chemistry, see Johnson, Academic, Proletarian, . . . Professional?

¹³⁸ Schiffmann, Revolution, 58.

¹³⁹ Die Vereine in der Anilinfabrik, *Vereinsblatt*, 1, Nr. 2 (May 1913), 3–4; Rundschreiben der BASF (Jan. 1909) and (April 19, 1912) re: free Saturday afternoons and midday breaks; (May 5, 1913), accepting technicians, office employees, masters and overseers in the Beamten-Pensionskasse, all BASF UA, C19/1.

¹⁴⁰ Engere Kommission des AR, 37. Sitzung (March 30, 1912).

Glaser took his place as chairman of the supervisory board, but the board elected no new members for several years. It was a tacit acknowledgment that von Brunck was irreplaceable. In eulogizing him Otto N. Witt wrote that

von Brunck's services . . . lie less in the area of inventive than of organizing work. In the latter, he was undoubtedly one of the greatest geniuses of our time. He knew how to keep track of the rapid development of our science in broad outlines and in all its branches, and with an unerring eye he surveyed the technical implications of every new accomplishment . . . On this basis he built the gigantic creations that emerged under his aegis. He knew how to find the right people to develop these creations, and he granted them the independence necessary for enthusiastic work. At the same time he was able to plant in them the corporate spirit that would make it possible for a large number of highly talented people to collaborate as if they shared one mind. In this sense of community . . . the Badische Anilin- & Soda-fabrik . . . has become a model for all German industry.¹⁴¹

Witt exaggerated, of course. No one man can truly shape a massive organization like BASF. It was not von Brunck who shaped the company's global marketing strategies. He also shared many traits of the corporate directors of his time that would quickly go out of fashion, including an autocratic bearing and a paternalistic attitude to the workers. But Witt was on target in evaluating von Brunck's technical leadership. Without him, BASF would probably not have developed indigo, and probably not have gone into nitrates either, to say nothing of developing Haber's high-pressure technology, with all its fateful implications. He also led his company into the first IG with Bayer and Agfa, and this too – with all the difficulties that had to be overcome – introduced a new era of concentration that beckoned toward an alluring goal, the grand merger of all the dye firms. In all these ways Heinrich von Brunck played a dominant role, setting his firm and others on the way from the classical dye industry he had known to the greater future he envisioned.

3. FROM OPPAU TO LEUNA: SYNTHETIC AMMONIA AND WAR (1912–1918)

The Ammonia Synthesis, 1912–1914

At the International Congress of Applied Chemistry in New York, in September 1912, August Berthsen spoke to an overflowing lecture hall (1,300 people were in attendance) on the technologies of fixing atmospheric nitrogen. Success here promised the solution of one of the world's critical problems, the growing demand for nitrate fertilizers. Three years earlier, on a similar occasion in London, he had emphasized the arc process, then at the center

¹⁴¹ Witt, Heinrich von Brunck.

of BASF's interests. Now he focused instead on the synthesis of ammonia, and he had good news: "I am in the pleasant position of being able to announce to you today, that we have achieved a complete technical solution of the problem of producing ammonia from its elements, and that the walls of our first factory for synthetic ammonia are already going up in Oppau near Ludwigshafen a. Rh."

But Bernthsen did not conclude, as von Brunck had done with indigo a decade earlier, by predicting the quick triumph of BASF's synthetic over all others. Instead he noted that, given the annual increase in fertilizer demand of 38,000 metric tons pure nitrogen equivalent, all of the competing sources of fixed nitrogen (imported Chile saltpeter and by-product ammonia from coking, along with nitrogen fixation by the Caro-Frank cyanamide and Birkeland-Eyde electric arc processes) could continue their "peaceful parallel development" without having much to fear from the new synthetic ammonia.¹⁴² Nevertheless, the fact remained: BASF had marketable synthetic ammonia, which promised to be the world's cheapest form of fixed nitrogen.

After the meeting in New York, Bernthsen also visited Washington, where he met the outgoing president, William Howard Taft. Bernthsen later recalled their seemingly casual exchange on national resources. After expressing a desire to have some of the German chemical works in America, Taft told him, "we want your potash," and Bernthsen responded, "and how is it about petroleum, sir?" Taft departed with a laugh, but under the witty repartee, Bernthsen saw "deeply serious implications."¹⁴³ In two short years, the advent of world war would focus everyone's attention on such strategic raw materials, and BASF's synthetic ammonia would become a vital resource for the German military.

How had BASF achieved its success? The history of synthetic ammonia in BASF is full of ironies, one of which is that Bernthsen, who reported its success, had been one of the main skeptics toward the process. Nevertheless, following the crucial demonstration in Karlsruhe in July 1909, BASF had begun to adapt Haber's process for commercial production. The problem, as always, was "scaling up" – transforming a laboratory experiment that produced a beaker of liquid ammonia into a commercial plant that could produce thousands of tons. Haber had only demonstrated the synthesis on a laboratory scale and seems to have been initially skeptical of its commercial possibilities. In the winter of 1907–08 BASF's main competitor in this area, Griesheim-Elektron, had discontinued its experiments after being advised that the necessary apparatus "could not be built."¹⁴⁴ Von Brunck, however, had seen his company solve more than one "impossible" technical problem,

¹⁴² A. Bernthsen, Die synthetische Gewinnung des Ammoniaks, Sonderdruck from ZAC, 26/1 (Jan. 3, 1913), Aufsatzteil, 10–31, here 16, 30–1; Bernthsen, Fünfzig Jahre Tätigkeit, 52.

¹⁴³ Bernthsen, Fünfzig Jahre Tätigkeit, 53. ¹⁴⁴ L.F. Haber, Chemical Industry, 92–3.

and he was a master at finding the right project managers to do the job. The leader he found this time was Carl Bosch, then only 35 years old.

Carl Bosch was a chemist-engineer, a relatively rare type in the Germany of his time, though not so uncommon in BASF with its many chemists trained in colleges of technology. Born in Cologne, the son of a businessman, he first studied four semesters of metallurgy and mechanical engineering at the College of Technology in Berlin, then three years of chemistry at the University of Leipzig. There he earned his doctorate with Johannes Wislicenus, an organic chemist, on whose recommendation Bosch entered BASF in 1899. Bosch's negative test results a year later on Wilhelm Ostwald's claimed catalytic ammonia synthesis, and his successful explanation of why it had failed (due to residual ammonia in the alleged iron catalyst), made him a man to be watched. Bosch repeatedly displayed decisiveness, energy, and resourcefulness in carrying out assigned tasks, as well as a strong sense of loyalty to the company, but at the same time a willingness to take technical risks and a refusal to be intimidated by older "authorities." He shared the engineer's sense for the capabilities of metals and machines, but also the chemist's faith in the possibility of synthesizing any natural material. This combination admirably suited him for the technologically sophisticated environment and managerial tradition of BASF. It made him a worthy successor to Rudolf Knietsch and ultimately Heinrich von Brunck, who came to value Bosch's judgment during the early encounters with Haber and who consequently assigned him the task of scaling up Haber's process. Before his death, Brunck saw to it that Bosch received substantial support in company resources, both technical and human, as well as sufficient autonomy to carry through the project without interference from other departments.¹⁴⁵

Bosch proved to be an ideal leader of the development team. "Bosch's personality aroused all his co-workers to thought and invention," recalled his chief engineer, Franz Lappe. Other recollections of the time agree on Bosch's unique role.¹⁴⁶ His leadership and insight helped to achieve technical solutions that produced the Oppau and later the Leuna ammonia plants, achievements for which he was later awarded a share in the Nobel Prize for Chemistry of 1931, and it ensured his rapid rise in the company. Bosch's team faced formidable obstacles in scaling up Haber's process from the laboratory apparatus of 1909.¹⁴⁷ Given the tremendous heat and pressure, stresses on the reactor vessels were tremendous; Bosch's team soon made the alarming discovery that they tended to weaken and explode after relatively short

¹⁴⁵ On Bosch: Holdermann, Banne; Oelsner, *Bemerkungen zum Leben und Werk von Carl Bosch* (1998).

¹⁴⁶ Franz Lappe, *Lebenslauf*, 28, typescript copy (December 1981) in BASF UA W1: Lappe; Philipp Borchardt, *Erinnerungen an Dr. Carl Bosch*, manuscript (Feb. 4, 1952), BASF UA, W1 Bosch/20/6.

¹⁴⁷ Many of these are reviewed in Bosch's Nobel Lecture of 1931.

exposures to the reacting hydrogen and nitrogen. Bosch tried metallographic analysis – still rare in the chemical industry, but a product of his early training – and found that the hydrogen appeared to be taking the carbon out of the steel, leaving a “brittle alloy.” His reputation was on the line; it was he who had argued that the German steel industry could produce materials strong enough to withstand the high pressures needed in the process. And he came up with the solution in February 1911, characteristically after a Friday night of bowling and drinking, which his colleagues recognized as a means of refreshing Bosch’s creative mind. The answer was to use a double-walled tube, the inner core formed of soft iron to contain the reactants while remaining impervious to the attacks of hydrogen, while the outer core of high-carbon steel maintained the pressure. Any hydrogen leaking through the inner core would harmlessly dissipate through small “degassing holes” (later called “Bosch holes”) bored in the outer shell. Following this achievement Bosch was appointed *Prokurist*, the first step in a rapid rise to the chairmanship of the board of directors by 1919.¹⁴⁸

Bosch’s co-workers also provided major contributions to the solution of a long series of technical problems presented by the process. A vital one came from Alwin Mittasch, initially aided by Georg Stern and Hans Wolf. This group developed the alternative iron-based catalyst that would replace expensive rare-earth elements and make commercial production practicable on a very large scale. Again, the irony was that this had been part of Ostwald’s failed proposal, and that Haber had also used iron, but found it less effective than other metals. But Bosch nevertheless argued that iron, with its complex spectral lines, was a promising contact substance; the key was to find the right alloy composition to unleash this potential. The initial catalytic research took two years to complete, testing 2,500 substances in some 6,500 experiments. The process nearly succumbed to catalytic poisons, whose build-up gradually destroyed the effectiveness of the catalysts, so that the equipment and gases had to be kept very clean and pure. Mittasch’s group became the nucleus of a much larger ammonia laboratory.¹⁴⁹

As Bosch’s team achieved success with a pilot plant by mid-1912, the company put him in charge of a new nitrogen department, which was to construct the first full-scale ammonia plant in Oppau, near the main factory. By September 1913 it began operating with an initial output of 30 tons of ammonia per day (soon increased to 40 tons), to be combined with sulfate and sold as ammonium sulfate fertilizer. The initial year’s output was only a few thousand tons, but Bosch was already designing much larger ovens to be put into operation in 1915. This raised more technical problems. Bosch’s engineer Franz Lappe recalled asking him how big the new ovens should be; his characteristic response: “we go to the limits of the German steel

¹⁴⁸ Nagel, Stickstoff (1991), 26–32; Lappe, Lebenslauf, 27–8; Travis, High Pressure, 10.

¹⁴⁹ Mittasch, Geschichte, 93; Mittasch, Chronik meines Lebens (typescript), 118, BASF UA, W1 Mittasch; Travis, High Pressure, 8.

industry.”¹⁵⁰ In practical terms, that meant modifying the design of the high-pressure ovens, because then-current steel technology limited the length of an 800 mm diameter pressure tube to six meters. To go longer, one had to construct 12 meter ovens out of two such units, bolted together. The new double-tube ovens weighed nearly twice as much as those of 1913 and with ten times the catalytic mass could produce about twenty times as much ammonia per day.¹⁵¹

This now required much larger supplies of raw materials, chiefly nitrogen and hydrogen. Unfortunately, the Linde process initially chosen lacked the capacity for large-scale production of pure hydrogen and also tended to leak a deadly by-product, carbon monoxide, endangering the workers. In 1912 Mittasch’s co-worker Wilhelm Wild had proposed a solution inspired by a process patented by Griesheim-Elektron. Wild’s colleague Christoph Beck, using the approach previously applied to catalytic work for ammonia, developed an effective catalyst for BASF’s “contact hydrogen process,” which converted the carbon monoxide to safer carbon dioxide and could adequately supply the larger ovens with much purer hydrogen.¹⁵²

The new process produced considerable environmental problems, however, because the sulfur that was removed from the gas in the form of soluble hydrogen sulfide was simply drained into the Rhine. Early in the war, and without official permission, BASF built a provisional, not very effective treatment facility. The government tolerated this because of the wartime need for ammonia, but the outflow of “poisonous and malodorous sulfur compounds” damaged the boats on the Rhine and threatened the health of their crews, resulting in vigorous protests. As a partial solution, BASF in 1918 tried locating the drainage outlet deeper in the river. But soon the post-revolutionary government of the Pfalz demanded that the factory’s wastewater be thoroughly cleaned “before it is drained into the Rhine.”¹⁵³ The BASF had no choice but to develop a new desulfurization process, which was first set up in a test facility toward the end of 1921.¹⁵⁴ Perfecting the new process took much longer, but an official analysis of water samples taken from the Rhine near the outflow point of the treatment facility showed in spring 1926 that the water was “to be regarded as chemically free from damaging influences on the environment or fish, insofar as these could be attributed to its hydrogen sulfide content or the presence of easily decomposed, oxidizable sulfur compounds.”¹⁵⁵ Precisely because of the importance of the product as well as the hazardous nature of the untreated wastewater (as formerly in

¹⁵⁰ Lappe, *Lebenslauf*, 30. ¹⁵¹ Figures in Nagel, *Stickstoff*, 56.

¹⁵² Georg Stern, *Die Geschichte der Ammoniaksynthese unter Druck der BASF*, 61–2, 97–102, in: BASF UA, G 6101; Nagel, *Stickstoff*, 34–7.

¹⁵³ Regierung der Pfalz, Kammer des Innern, to Bezirksamt Frankenthal (Jan. 7, 1919), in: SALU, Op. 1227, 47–8.

¹⁵⁴ Bezirksbaumeister to Bezirksamt Frankenthal (Nov. 24, 1921), in: SALU, Op. 1227, 29.

¹⁵⁵ Landwirtschaftl. Kreis-Versuchs-Station in Speyer to Bezirksamt Frankenthal (9.4.26), in: SALU, Op. 1226, 20.

the case of arsenic in the manufacture of fuchsine), BASF could be pressured to develop an important advance in environmental protection. Of course the firm also had an interest in recovering the sulfur. In other areas of dyestuff manufacture, the pressure to treat wastewater was less and improvements came much later.¹⁵⁶

The BASF's directors were extremely optimistic about the prospects for synthetic ammonia; they reckoned that they could produce ammonium sulfate without a loss, even at the lowest price on record. The question was how best to increase sales to a level at which larger-scale ovens provided even greater cost advantages. Existing demand for sulfate fertilizer would sustain the current level of production in Oppau, but how much could the market grow? Moreover, available sources of sulfur (currently in the form of pyrites imported from Spain) might not suffice to produce much more ammonium sulfate; the company would need to seek additional domestic sources. Meanwhile, to sustain an expanded level of ammonia production at 80–100 or more tons per day, at least double the current output and equivalent to many times the existing market for sulfates, the company would also have to convert its ammonia to sodium nitrate in order to compete with imported Chile saltpeter, the fertilizer that most German farmers preferred. This meant adding facilities for ammonia oxidation.¹⁵⁷

In designing its process for ammonia oxidation, BASF was competing with Wilhelm Ostwald, who with his assistant Eberhard Brauer had turned from the ammonia synthesis to the catalytic production of nitrates from ammonia. Notwithstanding the previous failure, Ostwald had first offered this process to BASF, the company with the best experience in catalysis, but again his financial demands were high and the company turned him down. Moreover, taking advantage of a weakness in Ostwald's German patent, BASF successfully appealed to the Imperial Patent Office, which allowed the company to develop its own, similar process. Ostwald eventually saw his process operated on a small industrial scale at the Chemische Werke Lothringen, beginning in 1912–13, but it required a platinum catalyst, which was far too expensive for large-scale production. Worse, the high temperatures produced by the exothermic process caused the catalytic metal to deteriorate. Bosch thus put Mittasch's group to work on this problem as well. After developing precise gas-analytic methods, they better understood the catalytic process and could develop an appropriate alternate catalyst – again, an iron-based one. By July 1914, Bosch's co-workers were constructing their first experimental oven for the new process.¹⁵⁸

To establish itself in the nitrogen market, BASF had to deal with the German Ammonia Syndicate (Deutsche Ammoniak Verkaufs-Vereinigung,

¹⁵⁶ Andersen, Pollution, 199–200.

¹⁵⁷ Engere Kommission des AR, 41. Sitzung (April 1, 1914).

¹⁵⁸ Stern, Geschichte, 117–120, in BASF UA, G 6101; Mittasch, Geschichte.

or DAVV), dominated by coking firms and gas companies producing by-product ammonia. When initial negotiations failed, the syndicate threatened to exclude BASF from the market by cutting prices and binding its customers with long-term contracts. BASF then purchased (jointly with Bayer) a majority share in a large superphosphate fertilizer factory in central Germany, which would guarantee a significant customer for BASF ammonium sulfate despite any action the DAVV might take.¹⁵⁹ Ensuing negotiations produced a settlement with the DAVV in the spring of 1914. The factory acquisition unexpectedly produced a loss, as its general manager had falsified the company's records; yet despite the swindle, BASF's directors considered the purchase useful as it had forced the DAVV to come to reasonable terms. During the war, they sold off their shares.¹⁶⁰

At Bosch's suggestion, BASF established an agricultural experiment station in 1913 to test its fertilizers. The station's first goal would not have surprised the indigo sales representatives of 15 years earlier: to demonstrate that there was no significant difference between the effect of synthetic fertilizer derived from BASF ammonia and that of the equivalent "natural" product. But here the company entered another branch of science in which it had as yet little experience, and for which it had to recruit a new group of experts.¹⁶¹

BASF on the Eve of the War, 1912–1914

BASF in 1913 remained one of the world's largest chemical companies, and it was once again undergoing rapid growth. After a decade in which its workforce had fluctuated between 7,000 and 8,000 (1903–11), it exceeded 8,000 for the first time at the beginning of 1912 and jumped to nearly 9,200 a year later. Hence it had grown by 50 percent since the turn of the century and 20 percent in the last two years alone. Whereas the earlier growth was mainly due to indigo, the later increase came from synthetic ammonia. In the new Oppau plant, Bosch's drive toward continuous production also brought different work rules in 1913, with three overlapping nine-hour shifts and no set breaks. Wages rose as well, partly due to inflation, but also with the rising skill levels required for a more sophisticated technology. As the company consequently sought to attract a stabler workforce (and forestall strikes and job actions), the total paid out in wages nearly doubled, 14 million marks in 1912 versus 7.88 million in 1900. The average daily wage had reached 4.00 marks at the turn of the century; after some fluctuations, it exceeded 5.00 for the first time in 1910, and by 1912 was at 5.38 marks. This increase of more than 34 percent significantly exceeded the approximately 25 percent

¹⁵⁹ Vorstand to Aufsichtsrat (Dec. 19, 1913), BASF UA, C10 (1906–1913)/3.

¹⁶⁰ Vorstand to Aufsichtsrat (Jan. 12, 1914), C10 (1914–1916)/1, Engere Kommission des AR, 41. Sitzung (April 1, 1914), pt. 2; Vorstand to AR (July 18, 1916), C10 (1914/16)/13.

¹⁶¹ Holdermann, *Banne*, 126–7.

increase in prices due to inflation during these years. The rapid growth, along with a still relatively high annual turnover in the workforce (still often more than 70 percent per year, albeit below the 80–85 percent figures of the turn of the century), necessitated the introduction of a more centralized and flexible personnel wage statistics system in 1913, based on separate cards for individual workers. This replaced the original “sheet system” that dated from before the turn of the century (following the German Accident Insurance Law of 1887), whereby individual production plants had kept quarterly sheets for groups of 25 workers. The payroll office introduced a similar card filing system in 1918.¹⁶²

The expansion of the workforce also led to significant extensions of the company’s welfare system, including the sickness and accident insurance offices and related medical facilities, the workers’ savings bank, and the opening of two recreational and convalescent homes. The dye companies led all German industry in the amount of supporting funds (*Unterstützungsfonds*) for their workers in 1909–10. By 1912–13, the dye branch’s spending on such funds rose to a remarkable level of 46.1 million marks (32.1 percent of dividend-bearing share capital). Equivalent spending by German industry as a whole remained below 3 percent. Foremost among the dye companies in this respect was BASF, whose directors continued to update their handsomely illustrated booklets, proudly describing the company’s welfare facilities. Of course, the dye companies could afford the luxury of elaborate welfare facilities largely because their branch enjoyed high profitability rates, reaching 37 percent of dividend-bearing share capital by 1913, versus a rate of 12.3 percent for all German industry that year. Even so, the dye companies’ welfare spending increased at a disproportionate rate.¹⁶³

Although the company had relatively little land on which to expand in Ludwigshafen proper, the main plant had seen considerable construction between 1900 and 1911. Much of this was related to the expansion of facilities for indigo production, especially in the first five years of the century, as well as to the subsequent improvements in transportation and loading facilities. From 1911 on, however, the main center of expansion shifted to the rapidly growing ammonia plant in Oppau, where the community agreed (after intense debate) to sell the needed land. With Oppau the balance of capital invested in buildings began to shift back from production facilities for organic chemicals to those for inorganics. These new buildings took on a

¹⁶² BASF directors to Bezirksamt Ludwigshafen (July 28, 1913), ZR2330, BI 63–5, SALU; Beiträge zur geschichtlichen Entwicklung der Verwaltung und ihrer eigentlichen Stellung im Gesamt-Betrieb, BI. 4–5, 16, 19, in BASF UA, C10/1.

¹⁶³ BASF UA, C720 (Sachgruppe Betriebliche Sozialpolitik), esp. C720/21–22 (Wohlfahrtsseinrichtungen), C720/25 (Betriebliche Sozialpolitik); C721 (Sachgruppe Pensionskasse); Rundschreiben of BASF (May 5, 1913) regarding expansion of Beamten Pensions-Kasse, BASF UA, C19/1. ZAC, 27 (1914), Wirtschaftlicher Teil, 745–749; BASF UA, C720/20 (Broschüren und Publikationen der BASF, copies from 1900 and 1913).

remarkably modern form. Bosch's scientific engineering approach aimed at continuous processes, operating on the largest scale, with machines replacing human labor, and with strict controls through meters and laboratory analysis to maximize efficiency. It was not always possible to achieve these goals, but in Oppau, far more than in the older, small-scale dye works, the technology shaped the plant and made it capital-intensive. The construction of Oppau thus necessitated another increase in the company's share capital, to 54 million marks (compared to 21 million before 1907), in order to cover a part of the 60 million marks in credits required for 1914 and anticipated for 1915.¹⁶⁴

Consumption of raw materials had also increased dramatically: in 1913 the company was using more than twice the metric tonnage of mineral salts, quicklime, and dextrin that it had in 1900. Since 1908 the consumption of pyrites, the essential raw material for producing the critical reagent suluric acid, had jumped from around 75 million tons of the level of 101.5 million tons (35% more). Energy consumption, in tonnage of coal and coke, had also kept pace: from more than 335 million in 1900, it had grown to exceed 455 million in 1931 (36% more). The rail network had more than doubled, from 42.6 km at the turn of the century, to about 90 km in 1913; moreover, machines – locomotives, motor-driven cranes and bulk conveyor belts for coal and pyrites, and an electric cable railway – were increasingly replacing the predominantly human- and animal-driven transportation and loading system that Duisberg criticized in 1904.¹⁶⁵

To administer an increasingly complex system, the company developed a growing number of specialized offices. A separate transport office (established 1908) supervised the rail and loading system, working together with the coal office, which also acted as the central purchasing office for the various raw materials previously mentioned, particularly sulfur and pyrites. The Main Office meanwhile coordinated shipping and deliveries, including the sale or disposal of factory wastes, surplus chemicals, and by-products not needed by the production plants, as well as a large variety of miscellaneous items from soap to safety matches to work uniforms.¹⁶⁶

The changing nature of BASF was especially marked in its research and technological development, as reflected in patent applications and in its academic staff. German patents peaked at 142 in 1913, nearly twice the level of 1900, but except for the alizarin group (35 versus 20) the number of dye patents was less than half (20 versus 49). New areas of organic research had appeared, with 30 patents for dyeing and tanning aids and plastics; although

¹⁶⁴ Mach, *Entwerfen und Bauen*, 25; factory plans for Ludwigshafen (1900–1911), in BASF UA; Braun, *Geschichte der beiden Rheindörfer*, 541; Engere Kommission des AR, 41. Sitzung (April 1, 1914), pt. 5.

¹⁶⁵ Beiträge zur geschichtlichen Entwicklung, BI. 9 and tables, BI. 17–20.

¹⁶⁶ Beiträge zur geschichtlichen Entwicklung der Verwaltung, 9–13.

organic research in the company generally fell off during the war, work in the new areas produced a significant innovation in 1916, the first synthetic surfactant, which helped dyes to soak into textiles (but reflecting the wartime context, it came out of an effort to synthesize glycerin, an explosives component). Patents in the nitrates and inorganic chemicals group tripled from 15 in 1908 to 46 in 1913. By the outbreak of war in 1914 the academically trained engineers in the company numbered about 80, twice the level of 1910 and four times what it had been at the turn of the century. The number of chemists remained under 250, only 10 percent more than in 1910, but 70 percent more than 1900. Three new physicists had taken Zenneck's place, including Paul Gmelin, in charge of the new operational controls introduced by Bosch.¹⁶⁷

As the company grew, it continued to build additional housing for workers and officials. Between 1911 and 1914 the company expanded its workers' housing in the area of Friesenheim and Hemshof, beginning with 160 separate two-story quad or double homes as before 1900. High prices necessitated a new approach in 1912–13, with row homes and apartment blocks, of which the company completed only the first group (with 104 apartments) before the war. Similarly, until 1914 the company had built separate double homes with gardens on the Limburgerhof; in that year the policy changed with the construction of 98 apartments in row houses. In view of the addition of more than 2,000 workers between 1911 and 1913 for the new Oppau plant, company housing was obviously failing to keep up with the expansion of the workforce. The new approach freed space for the new agricultural testing station, which became the primary function of the Limburgerhof after the war, as the land used there for housing did not significantly increase.¹⁶⁸ The Limburgerhof testing facilities had scarcely been established when, in the summer of 1914, war spread across Europe.

Mars Rising: Entering the War Economy

At the end of 1912, in a confidential address in the German Foreign Office, Robert Hüttenmüller had stressed the risks that war would pose for his industry. "It has taken hard work and struggle for the German chemical industry to achieve its successes on the world market.... Our remaining wish is that no deep disturbances of world peace will hinder the industry from further development."¹⁶⁹ This prayer went unanswered. The war plans that the

¹⁶⁷ Figures for patents in various areas (1877/1904–1914), Patentanmeldungen der BASF von 1877–1921 (table), Entwicklung der Arbeitsgebeite 1913–1940 (table), in Erfindertätigkeit in der BASF, BASF UA, E05/1; 125 Jahre BASF, 34; Curt Schuster, Geschichte des Hauptlaboratoriums 1938–1957, 243–4; von Nagel, Stickstoff, 32; von Nagel, Indanthren, 29–30.

¹⁶⁸ Entwicklung des Wohnungsbaus in Ludwigshafen bis 1945, 6–9, 12–15, SALU Gar1–2; Lehmler, Einfluss der BASF, 17–8; VT, Mensch, 288, 292; Holdermann, Banne, 126–9.

¹⁶⁹ Hüttenmüller, Die chemische Industrie, 15.

German general staff launched in August 1914 completely disrupted the German dye industry, which at this time controlled about 85 percent of the world dye markets. With the outbreak of war, the German government placed an embargo on dye exports. Overnight, BASF and the others found themselves cut off from the world market. Although the embargo was withdrawn by the end of August after protests by the industry's representatives, it was replaced by export controls to counter British efforts to obtain dyestuffs. The British meanwhile blockaded German ports. The Entente powers, France, Britain, and Russia, seized the German affiliates within their borders and interned the German staffs; patents taken out by German companies were eventually suspended, voided, or seized, opening the way for their enemies to develop their own competing dye industries. BASF found it increasingly difficult to obtain information about the fate of its representatives and outlets abroad. The company was able to salvage some profits because it had large stocks abroad in neutral countries at the outbreak of war, including a shipload that had just reached a neutral Portuguese port, so that it could be further distributed by the company's local representative. With the help of these stocks, the company continued to maintain a significant level of dye sales in the first year of the war, particularly to the United States, China, and Spain, as well as to Italy before that country declared war. Initially, the Russians permitted BASF to sell out the stocks from their Butirki affiliate (though of course the German staff was interned, and income had to remain in Russia), but the 1917 revolution ultimately cost the company its assets there. New dye production was mainly sold within Germany and to Austria-Hungary, except for Germany's neighbors in the Netherlands and Denmark. In the fall of 1915 the Dutch and German governments also worked out a secret deal to supply dyes to Dutch Indonesia, but this became problematic in 1916. The Swiss meanwhile made the most of their war-given opportunities, steadily expanding their sales in indigo, as BASF's own sales dropped by 45 percent in 1915 and continued to drop thereafter.¹⁷⁰

The war initially forced the company to shut down many of its manufacturing operations at home, not only because of the loss of markets, but also because of the induction of half of its workforce. The Oppau plant was among those affected in the early stages, when it still appeared that the war might be short: all experiments were suspended (including the ammonia oxidation work), and parts of the operations were shut down. Even after resuming work in Oppau, the company had to postpone a third of its total spending on plant construction.¹⁷¹

A further problem arose from shortages of raw materials because of military confiscations and the British blockade. Supplies of critical substances like

¹⁷⁰ Engere Kommission des AR, 42. Sitzung (Oct. 20, 1914), 44. Sitzung (Oct. 25, 1914), 45. Sitzung (May 2, 1916).

¹⁷¹ Georg Stern, Geschichte der Ammoniaksynthese, 120, in BASF UA, G 61101; Engere Kommission des AR, 42. Sitzung (Oct. 20, 1914).

sulfates and nitrates still came largely from foreign imports. Prussian military planners had incorrectly assumed that by not invading the Netherlands, they would be able to continue to import such materials through Dutch ports. They had made no effort to acquire a strategic reserve of raw materials, nor even to establish a system of rationing or even an organization to coordinate the confiscation and distribution of captured supplies. In early August 1914, as the Schlieffen Plan brought German armies into Luxemburg, Belgium, and northern France, Walther Rathenau of the AEG and one of his subordinates, Wichard von Moellendorf, recognized the problem and took the initiative in regard to raw materials. Their proposals led to two new organizations: first, the War Raw Materials Department (Kriegsrohstoffabteilung or KRA), organized under Rathenau's direction within the Prussian War Ministry in mid-August 1914; and then the War Chemicals Corporation (Kriegschemikalien AG or KCA), formed September 30, 1914, as a government-supervised consortium of 26 principal producers of war materials, including BASF. The KCA's purpose was to coordinate production, confiscation, rationing, and distribution of chemicals on behalf of the German military, so as to ensure reliable supplies during the war (the same model produced a host of similar war corporations for other strategic materials).¹⁷²

By September 1914 the war was taking on an unexpected character. The British and French stopped the German armies before Paris, at the battle of the Marne, putting an end to the dream of a quick victory and ensuring a war on two fronts. Moreover, the military leaders faced a munitions crisis; the production quotas called for in the prewar mobilization plans fell far short of the actual expenditures in the opening battles. The situation grew worse as the war of movement gave way to trench warfare. The defensive now predominated over the offensive; machine guns and artillery inflicted huge casualties on attacking troops. The only way to dislodge a deeply entrenched enemy appeared to be through extended artillery bombardments with massive quantities of high explosive. But production of high explosive required nitrates, and the Germans were soon cut off from their imports of Chile saltpeter. Despite the military's failure to amass substantial reserves of this crucial raw material, in the early months the KRA and KCA located supplies in domestic industry, agriculture, and importers' warehouses, as well as in the captured Belgian ports, and they purchased some in adjacent neutral countries. Without these stocks, equivalent to about 35,000 of the 55,000 tons of pure nitrogen used for German explosives in 1914–15, the Germans could hardly have carried on the war. As it was, they had a little time to find alternative sources.¹⁷³

¹⁷² On war corporations: Regina Roth, *Staat und Wirtschaft*.

¹⁷³ Szöllösi-Janze, *Losing the war*, 95–9; Herwig, *First World War*, 166–7; Duisberg, *Die Herstellung von synthetischem Salpeter* (April 1916), Bayer 201/20; Kriegsm. KRA, Feb. 5, 1916, Anl.-Nr. Ch. 136/16 (copy), BAMA W-10, 50521 (Chemikalien im Weltkrieg), BI. 236.

The main alternative would have to be ammonia (other options, such as Norsk Hydro's nitrates, were both limited and insecure), but ammonia would first have to be oxidized to produce nitric acid for manufacturing explosives. Aside from one small-scale operation (Chemische Werke Lothringen operating Ostwald's process), the Germans had no existing facilities for this purpose. But BASF realized that if it were possible to develop the oxidation of synthetic ammonia on a large scale, the company could use the war to expand its Oppau plant. After the war, it could use the expanded capacity to produce fertilizers. Yet in August 1914 the rapid creation of a large-scale ammonia oxidation plant still seemed "an impossibility" to the company's directors, when Haber initially inquired on behalf of the War Ministry. The company had not even completed its first experimental oven, but they had Bosch's leadership and Mittasch's iron-oxide-bismuth-based catalyst, which offered much greater opportunities for wartime large-scale production than Ostwald's platinum catalyst did.¹⁷⁴

Carl Bosch accompanied the senior directors who went to Berlin to discuss the situation in the War Ministry at the end of September. The result was BASF's "saltpeter promise," guaranteed by Bosch, who concealed the doubts he surely had: within six months, the company would produce 5,000 tons of sodium nitrate per month for military purposes. Authoritative support came from the government's nitrogen commission in the person of Emil Fischer, who advocated a full government subsidy of the project, and not least from Fritz Haber, who provided advice, information, and mediation as BASF's contact in the KRA. After weeks of negotiation, the government agreed to provide 6 million marks for a plant that would begin with 5,000 tons by May 1 and reach a capacity of 7,500 tons after August 1, 1915. In October 1914, as negotiations neared their end, BASF's directors hoped for "a permanent arrangement extending beyond the war, which would make it possible for us to supply the military for years to come with large amounts of nitric acid and ammonia." The additional support offered by the Prussian Agriculture Ministry to expand fertilizer production confirmed "the great significance of our ammonia manufacture, not only in peace but also in war. In future the production of ammonia is quite likely to be the strongest foundation of the profitability of our enterprise."¹⁷⁵

But first they had to build the plant. In September Bosch's team began feverishly working on the ammonia oxidation project, going directly to a semiworks scale. In Oppau, they designed and built a plant suitable for the concentrated ammonia produced there. Meanwhile, they worked out and sent to their IG allies plans for oxidation plants that could utilize dilute, by-product ammonia from the coking plants, thus competing with Lothringen.

¹⁷⁴ Szöllösi-Janze, *Losing the War*, 99–100; Christoph Beck, *Geschichte der Ammoniakoxydation in Oppau 1914–1938* (Feb. 18, 1939), BASF UA, G6301/5.

¹⁷⁵ Engere Kommission des AR, 42. Sitzung (Oct. 20, 1914); Szöllösi-Janze, *Losing the War*, 100–102; Holdermann, *Banne*, 136–138.

In November, Bayer began building based on BASF's plans and contract, without any changes. The plant was an inefficient but simple wartime expedient, and there was no time for improvements. By October 1 Bosch had the rough plans for a large-scale oxidation plant, and before the end of the month groundbreaking began on the "white salt factory," so named for the color of the nitrate. But many difficult problems emerged during construction and as the ovens were designed on an increasing scale. The first two went on-line in February 1915, the third somewhat later, and the rest beginning in May. These had catalytic surfaces nearly twice the size of the first ones, and thus (in principle) about double the productive capacity. Agfa began construction later than Bayer (as BASF's management initially resisted offering assistance to their other partner), and thus benefited from an improved version of the process, using concentrated BASF ammonia. Their production began in October 1915. Later BASF also replaced its "white salt [nitrate] factory" with an improved plant.¹⁷⁶

Otto N. Witt viewed the changes at BASF with considerable interest. In February 1915 he wrote to his friend Bernthsen, "Here [in Berlin] the common view is that the BASF has currently turned completely inorganic and no longer has interest for anything but the synthesis and combustion of ammonia and sulfuric acid, which is completely understandable. For who is going to master these great problems, if you do not?"¹⁷⁷ Despite Bernthsen's irritation at the suggestion that his company had lost interest in dyes, the war did transform BASF: by 1918, 78 percent of its nearly 3,331 million marks in sales consisted of war-related products. Synthetic ammonia and nitrates alone accounted for half of the sales in 1918, as the company produced nearly half of all the nitrogen used in the German economy. BASF had achieved record sales and profits in 1913, but even those sales (nearly 121 million marks, mostly from dyes) paled against BASF's gross *profits* of more than 150 million marks in 1916–17, the two peak years of the war. That money, however, largely went toward expanding the company's nitrogen plants.¹⁷⁸

BASF for the most part stayed out of the business of making explosives, but it did produce some "substitute weapons." Although BASF with most of the other dye firms had initially rejected early appeals to do so, citing their plants' lack of mandatory safety equipment, most big dye companies eventually did take up the challenge and by the end of the war produced a

¹⁷⁶ Georg Stern, *Geschichte der Ammoniaksynthese*, 120–122, in BASF UA, G 61101; Duisberg to Hempel (March 30, 1915) in Carl Duisberg Autographen-Sammlung, Bayer; Szöllösi-Janze, *Losing the War*, 103.

¹⁷⁷ Witt to Bernthsen (Febr. 23, 1915), in BASF UA, W 1 (Heinrich von Brunck), Bd. I.

¹⁷⁸ BAMA, W-10/5052, Bl. 425; Engere Kommission, 47. Sitzung (April 30, 1917), 49. Sitzung (Apr. 29, 1918) and 51. Sitzung (May 21, 1919), pt. 1–2 (large write-offs taken for new plant in 1918 produced a much lower profit level of under 11 million marks for that year).

large proportion of German explosives. Before the initial explosives shortage could be overcome, military authorities on both sides had begun to experiment with alternative weapons that would not require nitrates. In early 1915 BASF's academic partner, Fritz Haber, came up with one solution in the form of chlorine gas. Haber knew that German companies, including BASF, produced large amounts of electrolytic chlorine, one of the raw materials for indigo and other dyes. With dye production restricted, the chlorine plants were available. The toxic clouds, first released under Haber's direction in April 1915 at Ypres on the Western Front, forced unprotected enemy soldiers out of the trenches and produced a dramatic, but only temporary success. It inaugurated a race to develop new chemical warfare agents and protective devices, which continued throughout the war. The second agent used in large quantities was phosgene, far more toxic than chlorine. It too had been produced for dyes, and BASF could do so cheaply and in quantity, as it was produced from chlorine and carbon monoxide, the latter a by-product of the Oppau ammonia works. Utilizing its relationship to Haber, who took on a central role in the German chemical warfare effort, BASF became a major supplier of both chlorine and phosgene (which from 1916 on was mainly converted into diphosgene [*“green cross”* or *“Perstoff”*]), as well as intermediates for other new types introduced during the course of the war, such as arsenicals and mustard gas [*“yellow cross”* or *“Lost”*]. For mustard gas, BASF was the sole manufacturer of the intermediates ethylene chlorohydrin and thiodiglycol, which it had used in peacetime respectively in the ethylene process for indigo, and as a dispersing agent for certain dyes. The company wisely refused to produce mustard gas itself, an extremely nasty substance that produces severe burns and is very difficult to clean up. Clearly the company much preferred to produce raw materials or intermediates than the destructive end products.¹⁷⁹ This made for a better long-term development strategy, looking beyond the war.

The Leuna Project

During the fall of 1914, as the Imperial government committed large sums to expand nitrate production, the idea arose of establishing a national Nitrogen Trade Monopoly to regulate prices. Ostensibly this would ensure that German farmers would pay fair prices for their fertilizer, though it was also clear that the device could also be used to safeguard the government's investment in new nitrate plants. In December Karl Helfferich became Secretary of the Imperial Treasury Office. He was not only a strong supporter of the monopoly plan; he also advocated a “mixed-economy” solution to the nitrate problem, whereby the Reich would pay for and own a series of Imperial

¹⁷⁹ L.F. Haber, *Poisonous Cloud*, 157–9, 343–4.

Nitrate Works (Reichsstickstoffwerke) based on the Caro-Frank cyanamide process, to be operated by the Bayerische Stickstoffwerke, the company operating the process. He was not a disinterested participant, having been since 1908 a member of the board of the Deutsche Bank, which was one of the principal investors in the Bayerische Stickstoffwerke. This had earlier disqualified Helfferich for membership on BASF's supervisory board.¹⁸⁰ BASF's leaders rightly worried that the trade monopoly would fix prices so as to subsidize less efficient competitors while retarding the commercial development of its own synthetic ammonia.

After the Bundesrat passed the preliminary act establishing the trade monopoly and submitted it to the Reichstag in March 1915, the company mobilized all its resources against the plan. BASF invited about 20 members and leaders of the German Agricultural Society (Deutsche Landwirtschafts-Gesellschaft, or DLG) to visit Oppau in May 1915, hoping to impress them with the plant and with the potential value of ammonia products for fertilizer. Most of the members of the DLG's Fertilizer Committee did come.¹⁸¹ In June a Reichstag commission visited the Oppau factory as well. In June-July 1915, BASF widely distributed a memorandum to stimulate opposition to the monopoly proposal in the Reichstag. The directors took seriously the threat posed by the Caro-Frank interests and feared that the Reichstag commission would be inclined to support them, even after visiting Oppau, because directly after that visit it went to Trostberg, where the Caro-Frank group had a plant. Caro was there to make his case to them in opposition to BASF's synthetic ammonia.¹⁸²

The company added the powerful Krupp family to its list of visitors in June, having heard from Carl Duisberg of Bayer that both Gustav Krupp von Bohlen and his wife Bertha were interested in seeing the Oppau plant. The influential senior Bayer director, Henry von Böttinger, also proved to be an important ally who could report on the political situation, but BASF put special emphasis on the persuasive powers of authoritative academic chemists, above all Carl Engler and Emil Fischer. Because they were both influential, with reputations for objectivity, their arguments would be both "more effective and more suitable."¹⁸³ Engler's connection to the National Liberal Party leadership also made him an important source for developments in the Reichstag. Fischer had testified before the Reichstag commission in May, and both he and Engler spoke to influential members in July to counter the

¹⁸⁰ AR corresp. (Glaser, spring 1914), C10 (1914–16); documents in BASF UA, T14 (Stickstoff Handelsmonopol, Briefwechsel), Bd. 1–2; Szöllösi-Janze, *Losing the War*, 112–15.

¹⁸¹ Cf. correspondence with Freier, Vorsitzender des Vorstandes der DLG, and others (invitations dated April 16, 1915, acceptances in April), T14, Bd. 1.

¹⁸² Telegram BASF (Michel) to Reichstagsbüro, Berlin (May 31, 1915); other correspondence, T14, Bd. 2.

¹⁸³ BASF to Krupp (June 24, 1915), to Engler (July 30, 1915), T14, Bd. 2.

effects of their visit to Trostberg. Fritz Haber was of course an academic ally as well, who had vigorously defended ammonia against Caro's cyanamide in the nitrogen commission, but Haber's self-interest was all too obvious for him to be used as an "objective" authority in the public campaign.¹⁸⁴

The situation reached a decisive point in the summer of 1915, when Treasury Secretary Helfferich distributed a memorandum on the proposed nitrate monopoly and collected responses that led in August to additional amendments to the monopoly bill. This would have introduced price controls among other powers, but BASF's opposition, supported by the other dye companies as well as its academic allies, was by now strong enough to keep the bill from coming to a final vote in the Reichstag. The Imperial government ultimately decided to hold the threat of a nitrate trade monopoly in reserve, as a way of forcing BASF to come to a private price agreement with the other nitrate producers. Hence the company agreed to this, recognizing that the government would likely be able to put together a majority in the Reichstag for a trade monopoly if necessary to protect the millions it had invested in cyanamide plants; but BASF's directors nevertheless resisted taking the first step of offering terms to their competitors. It was clear by the spring of 1916, as the new cyanamide plants began to come on-line, that BASF would have an economic advantage in postwar competition. Cyanamide production required large amounts of electricity (albeit less than the arc process), as well as a much larger number of workers per ton of nitrogen.¹⁸⁵ Besides, by this time the Reich was about to invest substantial funds in BASF's second ammonia plant, in a central-German location offering greater security against air raids.

In late 1914, Carl Engler first called BASF directors' attention to the potential of air raids. In March 1915, Emil Fischer, now deeply involved in war chemical work, warned the *Chemiker-Zeitung* to avoid mentioning saltpeter factories in its articles because he also feared air raids.¹⁸⁶ Because of its location near the French frontier, BASF's Oppau works was one of the most vulnerable nitrate plants, and it would be only a matter of time before it was attacked. After the first chlorine gas attack in April, the chlorine production facilities in Ludwigshafen also made that plant a military target. The first French air attack against BASF came a month later, on a sunny morning in late May 1915; neither Ludwigshafen nor Oppau had any air defenses, and the planes could bomb unhindered. Nevertheless the initial damage was light, corresponding to the as yet relatively low carrying capacity and primitive bombing technology of the military aircraft of 1915.

¹⁸⁴ Szöllösi-Janze, *Losing the War*, 114.

¹⁸⁵ 45. Sitzung der engeren Kommission des AR (May 2, 1916); correspondence in T14 (Briefwechsel), 1-2; Szöllösi-Janze, *Losing the War*, 115.

¹⁸⁶ Engler to AR (Dec. 24, 1914), BASF UA, C10 (1914-16)/8; Fischer to *Chemiker-Zeitung* (March 18, 1915), EFP.

BASF could continue all of its production operations uninterrupted. Unfortunately for the workers, they had also become targets; the train carrying the morning shift from Ludwigshafen to Oppau was bombed, and there were some casualties. The home front and the fighting front were beginning to merge.¹⁸⁷

Other air raids followed, gradually becoming a regular occurrence especially on clear moonlit nights. The German military authorities provided BASF with increasingly strong air defenses, beginning with a single machine gun post, later a ring of anti-aircraft artillery with searchlights, and eventually by 1918 some fighter aircraft. Efforts at camouflage and deception included the erection of a sham factory downriver, but misled few attackers, who could hardly miss the company's prominent location at the confluence of the Rhine and Neckar rivers. The effect of the raids on civilian morale in the surrounding communities was considerable, as repeated alarms on clear nights drove people into their cellars. But the air defenses usually prevented serious damage to BASF facilities. Nevertheless the frequent brief shutdowns and restarts resulting from air alarms caused unusual wear on the apparatus, especially given the inferior quality of wartime steel. The larger ovens, the first of which came on-line in May 1915, had outputs only one-third of the estimated 40 tons of nitrogen per day, and ovens expected to last at least 2–3 months to a year, actually became defective after a few weeks. To minimize damage from reheating, it was ultimately decided to continue production even during a raid. Even so, production levels were "considerably" below quotas, which, given the priority of nitrates for munitions production, left the farmers with insufficient amounts of fertilizer.¹⁸⁸

The company thus needed to find a safer location for production. There ensued in 1915–16 a long period of negotiations with the military authorities and the Imperial government, initiated by Franz Oppenheim of Agfa and further mediated by Fritz Haber, in regard to building an ammonia plant in central Germany, far from the fighting fronts. BASF wanted the Reich to assume all costs and risks, on the assumption that the new plant would lose its value due to excess productive capacity after the war. Helfferich in turn proposed a "mixed" enterprise on the model of the Reichstickstoffwerke, whereby the government would own the new plant and BASF would operate it, but this BASF flatly rejected. Ultimately the company accepted a compromise in which the company provided the basic construction costs, with subsidies and loans from the Reich to cover excess wartime costs. The full amount of the government funds was to be contingent upon BASF's constructing a fertilizer plant during the war along with the ammonia plant.¹⁸⁹

¹⁸⁷ Georg Stern, *Geschichte der Ammoniaksynthese*, 130–1, in BASF UA, G 61101.

¹⁸⁸ Stern, *Geschichte der Ammoniaksynthese*, 63–4, 132, in BASF UA, G 61101; Direktion to AR (July 9, 1917), BASF UA, C10 (1917–20)/1.

¹⁸⁹ Szöllösi-Janze, *Losing the War*, 115–18; correspondence in BASF UA, C10 (1914–1916)/12.

While negotiations dragged on, the company explored possible sites. The new complex would require nearby lignite deposits for energy (unlike the Oppau plant, which used coal). A nearby river would be needed to supply water to the plant. Once the agreement with the government was signed in April 1916, BASF began to construct its new ammonia plant at the village of Leuna near Merseburg on the Saale River and on the main rail line between Berlin and Frankfurt am Main. The project was initially designed for a capacity of 36,000 tons of nitrogen, which would approximately double the production of synthetic ammonia. By this time, Germany had a capacity to produce 60,000 tons of nitrates from ammonia (mostly through BASF, Bayer, Griesheim-Elektron, and Agfa as well as Lothringen), but shortages of ammonia in the spring of 1916 left almost half that capacity unused.¹⁹⁰ With the ammonia from Leuna, the Germans could fully utilize their existing nitrate production capacity. The Leuna project was not just an extension of the initial phase of wartime mobilization, however, but the key to a new phase, embodied in the Hindenburg program beginning in fall 1916. In this new phase, the goal was to double the productive capacity for powder and explosives. Plants were built no longer simply for temporary wartime use, as the first ammonia oxidation plants had been, but to create a permanent, long-term capacity for munitions production to be maintained in peacetime as an economic reserve for the next war. Leuna too was intended as a permanent facility whose ammonia had a dual use: initially to produce nitrates for the military, but after the war to make fertilizer for farming.

As the Hindenburg program was developed, the military pressed for even more capacity in Leuna, for which BASF demanded much larger government subsidies in order to cover the growing risk that the new capacity might exceed commercial viability. The resulting contract for the second phase of construction, signed in December 1916, called for increasing Leuna's capacity from 75,000 to 130,000 tons per year, and for building an ammonium sulfate fertilizer factory. The latter, begun in April 1917, was unfortunately not ready for production during the war. The military meanwhile pressed for a third phase of expansion to raise Leuna's capacity to 200,000 tons of nitrogen, agreed to in a contract signed in June 1918. The Reich agreed to pay the entire building costs for the third phase, which BASF estimated at 200,000 marks; in return, the plant was to be kept in readiness until 1940. Provision was made for the government to purchase, at set prices, nitrates produced above levels that the market would bear, but the government also insisted on the right to review the production price calculations.¹⁹¹ When complete, the Merseburg facility's total capacity would be twice that of Oppau, which was also expanded but to a lesser degree. The war ended, however, before the company could complete even the second phase at Leuna.

¹⁹⁰ Duisberg, Die Herstellung von synthetischem Salpeter (April 1916), 5, in Bayer 201/20.

¹⁹¹ Direktion to AR (June 17, 1918) and Vertrag, BASF UA, C10 (1917–1920)/3.

Bosch attempted, and the company nearly achieved, the spectacular feat of constructing the first Leuna works within nine months. The plant had to be built from the ground up, beginning in April 1916 with land purchases (mostly obtained from unhappy local farmers at confiscatory prices under military orders). Groundbreaking followed on May 1, 1916, and by November 1916 the first set of buildings, including ammonia production systems, the gas factory, and boilers, were ready to be fitted with machines. At the same time, the company established appropriate rail, water, and electric facilities, and purchased lignite mines (and later, gypsum deposits for sulfate). A core of skilled workers came from Oppau and Ludwigshafen, but many more, including veterans, prisoners, and foreign civilians, had to be requisitioned from the military. The company built a temporary barracks city to house them, pending the construction of more permanent quarters. Similarly, the military had to authorize the necessary raw materials for construction and production, but here the top priority enjoyed by the project placed the company in a relatively favorable situation, despite the innumerable shortages and bottlenecks induced by the Hindenburg program from September 1916.¹⁹² In his customary style, Bosch delegated much of the responsibilities to younger associates. One of the young chemists who distinguished himself in directing the construction of the Leuna plant was Carl Krauch, who had already caught Bosch's attention as a production manager in the Oppau ammonia factory after returning from service at the front. When wintry weather and backlogs in iron production stalled progress in early 1917, Bosch dispatched Krauch – “a man with guts” – to Leuna to help the plant manager break the deadlock. By April, with crews working around the clock, nearly all of the first construction phase was complete, only three months behind schedule.¹⁹³

Finally at 6 p.m. on April 27, 1917, Krauch gave the order “Start up!” and Leuna fired up its first ammonia oven. On the morning of April 28, 1917, the first tank car of ammonia was filled at Leuna; on its side one could read, proudly scrawled, “Frenchmen’s death.” In the final year of the war, Leuna and Oppau together would produce about 90,000 tons of nitrogen, almost all destined for munitions. Three months later, Hindenburg thanked the company for its loyal support of the military leadership by sending an autographed photograph addressed “to their loyal collaborators” at BASF. “The times are hard,” Hindenburg wrote, “but victory is certain.”¹⁹⁴ But not

¹⁹² Entwicklung des Ammoniakwerks Merseburg (bis March 1919) and Aus alten Leunazeiten, in A1302: Errichtung des Ammoniakwerkes Merseburg 1915–1921, BI. 49–53, 291–299; A1303: Chronik des Ammoniakwerkes Merseburg 1916–1921, BI. 11–14, in Bestand Leunawerke, LAM.

¹⁹³ Holdermann, Banne, 147.

¹⁹⁴ Engere Kommission des AR, 51. Sitzung (May 21, 1919). Aus alten Leunazeiten, BI. 295; Braun, SchichtWechsel, 54; framed photograph of Hindenburg on the wall of the BASF UA, dated July 30, 1917.

everyone in the company was so certain of victory, or so pleased at the collaboration that had made possible the firm's wartime growth. Three weeks before the first ammonia flowed at Leuna, the United States entered the war on the side of the Entente. Like many if not all of the specialists who were aware of American technological capabilities, Carl Bosch concluded that in the long term, the German cause was hopeless. Given that possibility, he had to wonder whether his work had only extended the war and pointlessly increased its misery.¹⁹⁵ Lappe later recalled that in early October 1914, immediately after the "salmeter promise," Bosch had promised to drink himself "the biggest high of my life, when this dirty business is over."¹⁹⁶ That was no doubt in the expectation of a German victory. Whether he celebrated the actual end of the "dirty business" in 1918 is unknown. Alwin Mittasch, his associate, was also conscious of the tragically ironic implications of his own work and reflected on them in his memoirs, written at the end of a second, even more destructive world war.

Moreover, I am myself not wholly without guilt in regard to the way things have happened. If the process I invented with Christoph Beck for obtaining nitric acid from ammonia had not been lying ready in the drawer in the fall of 1914, Germany would certainly have had to give up the struggle in the spring of 1915 – and how very different would world history have come out then?¹⁹⁷

The achievement of Bosch and his associates in creating a massive industrial complex from a greenfield site was nevertheless one of the most impressive accomplishments of wartime industry. But there was much in the new project that left the leaders of BASF uneasy, not merely the increased risk entailed in investing in permanently excess capacity, but also the geographic separation between Leuna and Ludwigshafen. This could well awaken unpleasant memories of the tensions that had arisen between Ludwigshafen and Stuttgart during the fusion period of the nineteenth century. In any case, the Merseburg region presented new and unexpected problems for BASF in dealing with local government and the local population, and not least a large, newly recruited workforce, whose attitudes and loyalty to the company were uncertain. Finally, the huge new complex with the massive investments it required also shifted the balance in the IG, which by 1916 had itself been expanded from the Dreibund of 1904.

Wartime Reorganization: The Expanded IG

Military-technological considerations played an important part in forming the so-called "expanded IG." of the dye producers at the end of 1915 and

¹⁹⁵ Cf. Bosch's lecture as he received the Exner-Medaille in Vienna (Dec. 16, 1932), cited in Hayes, Carl Bosch and Carl Krauch, 356; Holdermann, Banne, 150–153.

¹⁹⁶ Lappe, *Lebenslauf*, 42–3. ¹⁹⁷ Mittasch, *Chronik meines Lebens*, 370.

beginning of 1916. By this time several prewar competitors, either independent firms such as Griesheim-Elektron or groups such as the Höchst-Cassella-Kalle “Dreibund” versus the BASF-Agfa-Bayer Dreibund, had already been forced to share technological knowledge in several (though not all) critical areas, which overcame one of the major obstacles to their uniting. At the same time, it was clear that governments in enemy as well as neutral countries were actively trying to create independent dye industries that could compete with the Germans after the war. Hence it was easier to persuade all of these companies, plus the smaller firm Weiler-ter Meer, that it was in their interest to form the industry-wide alliance of dye companies that Duisberg had unsuccessfully campaigned for in 1903–04, and that he proposed again in July 1915. In the process, the member firms of the expanded IG absorbed a few smaller competitors as well.¹⁹⁸

Although BASF did not take the initiative in creating the expanded IG, in view of BASF’s wartime expansion the reorganization was likely to be of special concern to the company. Indeed, reading Duisberg’s new proposal in July prompted Carl Glaser to revive Duisberg’s original idea back in 1903 for a complete “fusion” of the dye industry. BASF’s directors nevertheless feared this was premature.¹⁹⁹ One of their principal concerns was the status of the company’s ammonia business and how its profits might be shared among firms in the expanded IG, whose main concern was after all the dye industry. Citing the unpredictability of the ammonia market and the still undetermined development of Oppau (not to mention Leuna), BASF’s directors proposed to exclude their ammonia business entirely from the IG agreement. But to this notion the directors of the Farbwerke in Höchst strenuously objected. BASF therefore accepted a compromise that reserved all the income from ammonia for the first 10 years of the agreement to the old Dreibund, whose contract was renewed and extended to run parallel with the new IG, until the end of 1965. Profits would begin to flow to the expanded IG during its second decade, first in various quotas, and ultimately in their entirety. The same provision would apply to Höchst’s profits from nitrates produced from the cyanamide process in the Stickstoffwerken Knapsack, in which it held a controlling interest, as well as to Höchst’s other products from calcium carbide. Griesheim’s reserved area was the electrolytic production of metals, in which the other firms promised not to compete before 1936. In other areas, Duisberg’s principle applied: in order to maintain competitiveness within the IG, “all important products should be manufactured at two different places, that is, by at least two companies.” Hence initially the expanded IG was mainly limited to its traditional core area, coal-tar dyes and related

¹⁹⁸ Hüttenmüller and Müller to Glaser (July 29, 1915), and other correspondence in BASF UA, C10 (1914–16)/10. On the IG in general see Plumpe, IG Farbenindustrie; L.F. Haber, Chemical Industry, 279–80.

¹⁹⁹ Glaser to Vorstand (Aug. 1, 1915), Glaser, Deutsche Vereinigung Chemischer Industrie (Aug. 1, 1915); Hüttenmüller and Müller to Glaser (Aug. 3, 1915), in BASF UA, C10.

products, such as pharmaceuticals; but its planners also anticipated a gradual change in the character of their industry. Phasing synthetic ammonia into the IG would protect BASF against the unexpected emergence of more efficient competitors to Haber-Bosch, with the sort of unpleasant consequences that Höchst's indigo had once produced. Aside from the excluded areas, BASF, Bayer, and Höchst, as the three largest firms, agreed on proportional shares of the profit pool, with smaller shares for the rest. The same quotas applied to capital increases.²⁰⁰

To meet its wartime expansions in plant, BASF sorely needed more capital. As of the beginning of 1917, BASF was committed to spending 543 million marks, including 38 million to obtain additional lignite deposits. By October, 401 million remained outstanding, of which the Reich was unlikely to cover more than 199 million and BASF's existing funds only 40 million, leaving 162 million marks to be covered with the help of the IG. The firms of the expanded IG thus agreed to increase their share capital by two-thirds. For BASF this meant 30,000 new shares, raising its capital to 90 million, up from 54 million in 1914. A regional financial group would no longer suffice; now the IG worked through a consortium headed by the Deutsche Bank, thus bringing BASF closer to the big banks.²⁰¹

The wartime changes in the structure of the dye industry also brought changes in the leadership of BASF. Carl L. Müller, who before the war had assumed Heinrich von Brunck's role as technical director of the entire company, had announced his intention to retire before the outbreak of war. He stayed on for two years to manage the difficult transition from peacetime to wartime production, but by 1916 he could no longer be persuaded to remain in the directorship. In 1917 he entered the supervisory board. Müller had been a dye chemist, one of whose principal concerns had been the indigo process. His successor was Carl Bosch, whose contributions to the success of ammonia and nitrate production made him the company's indisputable technical leader in the new era. As a newcomer who had not worked in dyes, however, he was not given complete control over the traditional core products of the company; nor did he take over the labor relations and welfare departments. Other directors maintained responsibility for these areas, and the top commercial and administrative director, Robert Hüttenmüller, stayed on until he fell ill following the Armistice and died in July 1919.²⁰²

From Labor Truce to Mass Protest: The Workforce at War

Of all the changes brought by the war, some of the least welcome – to the company's directors – came in BASF's workforce. Like companies all across

²⁰⁰ Engere Kommission des AR, 45. Sitzung; citation from para. 16 (3), copy of IG contract (Aug. 18, 1916), in BASF UA, A16/1.

²⁰¹ BASF Direktion to AR (Oct. 20, 1917); Begründung der Anträge an die Generalversammlung, BASF UA, C10 (1917–1920)/2.

²⁰² BASF UA, W1; Hüttenmüller, Müller; BASF UA, C10 (1914–16)/13; Glaser correspondence.

Germany, BASF lost nearly 5,000 workers to conscription during the first months of the war, 43 percent of the workforce. The figures offered plausible evidence of inadequate economic planning for a long war. By the end of the war's second year, the conscripts had been decimated: more than 500 (462 workers, 82 officials) had given their lives for the fatherland. Older men replaced many of the healthy young men, formerly the backbone of the staff; others returned to work as disabled veterans. By the end of the first year, however, the company's workforce began to grow again, mainly through the expansion of the Oppau nitrate facilities. Even with various supplements including prisoners of war, in the spring of 1916 BASF faced shortages of about 200 unskilled workers. For the first time, the company asked the local government for permission to employ 250 women over 18; subsequent increases raised the limit to 2,500 two years later. As by October 1918 the company had recruited only 1,900 women, it wanted to hire girls under 18 as well, to which the government objected as the work rules required 7 1/2 hours with only a 10-minute meal break, which the management was unwilling to extend.²⁰³

In 1915 the government not only provided the company with skilled workers reclaimed from the front and from other companies to help in construction, but also allowed the use of interned Russian-Polish laborers. A particular problem arose from 400 Russian prisoners of war, whose unskilled labor seemed generally satisfactory at first, but whose attitudes were marked by "insubordination." As this grew worse, accompanied by rejections of the company's food (eaten without complaint by their own employees, the directors noted), BASF's management felt compelled to take action against what seemed to be excessive leniency in the treatment of the prisoners. They reduced the numbers by about a third, transferring the worst complainers, and brought in a supervising officer "who, correctly assessing the situation, introduced a strict regimen." This made the situation more "bearable" for the company, though probably not for the Russians.²⁰⁴

From mid-1916 on the company's workforce grew at an accelerating pace to expand its nitrogen production facilities, resulting in an increasingly acute labor shortage, estimated at 453 by the end of 1917. Although many of the company's workers could be reclaimed from the front, these did not fully meet the need. Toward the end of the war, the company was using more than 900 prisoners of war, 900 German soldiers, and nearly 600 Belgian civilian workers. Its total workforce, including all of these groups and in Ludwigshafen-Oppau as well as Leuna-Merseburg, exceeded 22,000, double the prewar staff, not including thousands more working for building

²⁰³ Engere Kommission des AR, 46. Sitzung (Oct. 27, 1916), pt. 3; VT, Chronik der Badischen, 709–19; correspondence on women workers (July 1916–Fall 1918) in ZR2330, Bl. 148–9, 155, 171–3, 176, 185–9, SALU; quote from BASF to Bezirksamt (Oct. 5, 1918), Bl. 187.

²⁰⁴ Engere Kommission des AR, 43. Sitzung (Apr. 16, 1915), 44. Sitzung (Oct. 25, 1915), 45. Sitzung (May 2, 1916), 46. Sitzung.

subcontractors on both sites. Perhaps the most significant change was a large increase in its demand for skilled and crafts workers, needed especially to build, operate, and maintain the more complex and technologically sophisticated ammonia production facilities in Oppau and Leuna-Merseburg. Their share of the workforce rose from less than 21 percent before the war to 28 percent at its end.²⁰⁵

The company sought to adapt its tradition of social welfare support for its workers and their families to wartime exigencies, instituting small supplementary payments for the families of those who had been inducted, sending Christmas packets to the men in the field and promising that they would be allowed to return to their old jobs. The rest homes became military hospitals, and BASF also contributed to the Bavarian War Disability Fund and made other war donations. From April 1915, BASF also paid inflation supplements to the home staff. Toward the end of the war, the company even provided loans to its staff so that they could join at a higher rate in the government's seventh war loan. As elsewhere in Germany, food posed a growing problem, complicated by the British blockade, nitrate fertilizer shortages due to munitions demands, and various failures in the government's food policies. These problems contributed to the growing discontent among the workers. As an essential part of the munitions program, BASF was, however, in a somewhat more favorable situation and could obtain additional food to supplement its workers' rations. In 1917, following the notorious "turnip winter" in which there were severe shortages and sharp increases in food prices, BASF created a food clearinghouse, which spent millions to obtain meat, fat, and cheese to be resold at a discount to its workers. This led workers at other factories in the region to complain to the authorities of unfair treatment; finally, in the spring of 1918, the government discontinued the practice. Even after this, however, the company's workers received higher rations than others not in munitions factories.²⁰⁶

Working conditions changed as well during the war. By early 1918 transportation problems forced the company to move from overlapping nine-hour shifts to eight-hour shifts in the Oppau craft shops. The "undivided work time" seemed to work well, but the managers decided not to introduce it in Ludwigshafen in view of labor shortages that would make it impossible to carry on continuous operation.²⁰⁷ By the end of the war, however, all workers would see the eight-hour day as their right. Despite its labor

²⁰⁵ Braun, *SchichtWechsel*, 55; cf. Patton, Flammable Material, Table 10, 327; 45-50. Sitzung der engeren Kommission, Fragebogen and Arbeiterkarte (Oct. 1918) in BASF UA, A862/1, Demobilmachung u. Beutegut; Chronik: Ammoniakwerke Merseburg, LAM, A1303, BI. 30.

²⁰⁶ Engere Kommission des AR, 44. Sitzung, 47. Sitzung (April 30, 1917), 48. Sitzung (Nov. 2, 1917), pt. 4; 49. Sitzung (Apr. 29, 1918), pt. 5; Rundschreiben on wartime food sales, BASF UA, C19/1. On wartime food problems in general: Offer, First World War; Burchardt, Impact of the War Economy, 40-70; Feldman, Army, Industry and Labor.

²⁰⁷ Engere Kommission des AR, 49. Sitzung (Apr. 29, 1918), 23.

shortages, the company tried to avoid significant wage increases beyond the minimum required to deal with wartime inflation, and it continued to support its company union while resisting the efforts of the independent labor unions to organize the workers. The unions were also handicapped by the truce (*Burgfrieden*) agreed to by their national organizations at the outset of the war, which limited union activity during the war.

The Patriotic Auxiliary Service Law of December 1916 brought a decisive change in the company's relations to its workforce. For the first time, the company was forced to recognize an organized representation other than the company union. Elections to workers' and employees' committees were held, on the principle of proportional representation. The committees were to negotiate with the employers over issues of wages and working conditions. Unresolved disputes would go to an official arbitration board. Initially the company's Workers Association maintained its authority in the workers' committee, but as its leaders essentially took the side of management on wage issues, the rank-and-file workers became increasingly discontented. In Leuna, the rough living conditions in the workers' barracks increased tensions, and the pressure for rapid construction led to thousands of accidents, including 49 deaths in 1917–18. By June 1918 the company union had lost control of the committees to the "free" trade unions in both Leuna and Ludwigshafen-Oppau. These defeats heralded the end of the era of BASF's company union.²⁰⁸

Despite the official labor truce, worker discontent led to mass protests and brief work stoppages in Leuna, notably in August 1917 in conjunction with a national antiwar strike organized by the radical Independent Social Democratic Party (USPD). Some wage and other concessions followed, but fear of further actions led the managers to call upon the military authorities to threaten the workers with mass conscription – not to be sent into battle, but to be forced back to work at soldiers' pay. Police actions and the dismissal or transfer of radical leaders kept Leuna quiet at the end of January 1918, when there was another socialist-led strike across Germany demanding an end to the war. This time, even BASF's workers in Ludwigshafen-Oppau joined in the brief work stoppage, though the moderate "majority socialist" leaders in the Pfalz avoided further strikes until the end of the war. But in Leuna, the workers' committee forced wage concessions for both production and construction workers in August 1918 by threatening a strike and refusing arbitration.²⁰⁹

Much to the surprise of BASF's directors, the salaried employees' committee established by the Auxiliary Service Law proved even more demanding and less cooperative than the workers' committee, despite the company's

²⁰⁸ Breuning, *Soziale Verhältnisse*, 539–44; Streller and Madfalsky, *Geschichte*, 22, 32.

²⁰⁹ Breuning, *Soziale Verhältnisse*, 535–9, 551–3; Patton, *Flammable Material*, 208–10; Streller and Madfalsky, *Geschichte*, 27.

various inflation supplements and other benefits. In the fall of 1918 the employees' committee demanded big raises (35 percent for salaries under 3,000 marks, 15 percent for those over 5,000, 25 percent for the intermediate group), and threatened to go to arbitration. The directors rejected these demands on the grounds that their salaries were not out of line with those in other IG firms, and promised to reconsider the salary issue in the following year. There, on the eve of the revolution, the matter rested – uneasily.²¹⁰

As the war neared its end, BASF's directors looked forward to the re-conversion to peacetime production. They expected to lose the temporary workers they had been obliged to employ during the war, especially the difficult prisoners, but also the majority of the women. This would make room for all the approximately 4,700 workers they expected to welcome back from the war. Nevertheless, they were not going to return to prewar conditions. Women would now have a permanent place in the company, with nearly 500 expected to stay on. Now that it would again have access to world markets, it hoped to compete as effectively against Chilean nitrates as against the German cyanamide producers, and it also hoped to recover many if not all of its prewar dye markets. It was clear that the transition would be difficult. But the company could hardly have anticipated the depth of the problems that the coming revolutionary era would bring, or the violent confrontations that would disrupt their hitherto mostly peaceful labor relations.

4. FROM CRISIS TO FUSION (1919–1925)

Defeat and Revolution: New Leadership Facing Postwar Challenges

On November 4, 1918, Carl Glaser grimly reported on the state of the German war effort to the select commission of BASF's supervisory board. Since the summer, "our military and political situation has grown considerably worse," to the point that one could describe it in a single word: "collapse." Enemy troops could occupy Ludwigshafen. The board must therefore take immediate steps to deal with this calamitous situation.²¹¹ A timely warning – within a week came the Armistice and a German republic.

The Armistice forced the German military to cancel all its orders for explosives and other war-related chemicals, which in 1917–18 had reached 78 percent of the company's total sales. Dyes, BASF's major prewar product, were now being produced in much larger quantities than before the war in France, Britain, and the United States, and with government support. Like other German dye firms, BASF's foreign factories in formerly enemy countries had been taken over, their patents confiscated, sales offices closed

²¹⁰ Engere Kommission des AR, 48. Sitzung, pt. 4; 50. Sitzung (Nov. 4, 1918), pt. 3.

²¹¹ Handwritten notes for the meeting of November 4/5, 1918, BASF UA, C10 (1917–20)/3.

or in disarray, markets closed. Despite the peace treaty with Soviet Russia, opportunities there grew worse as civil war followed revolution and the economy collapsed. By 1919 even dye smuggling became impossible; after hiding BASF's documents and funds to avoid confiscation, the firm's representative in Moscow was forced to take up other work in order to stay alive.²¹²

The occupation of the Rhineland further confirmed the wisdom of locating the new ammonia plant in central Germany. BASF hurriedly moved large quantities of dyes from Ludwigshafen across the Rhine shortly before the French army marched in on December 6, 1918, confiscating stocks and restricting passage across the river. French military chemical inspectors soon arrived, followed by a long series of other Allies' technical missions, whose goal was to extract as much critical technological information as possible from the German chemical and explosives plants along the Rhine. Despite the official purpose of promoting German disarmament, in many cases the inspectors also sought useful commercial information for Allied competitors. The continuing British blockade (kept in effect to force the Germans to accept the peace treaty), confiscations, and other occupation-related trade restrictions extended the wartime shortages of food as well as of coal and other materials, which forced the closure of many plants. Those that could operate could not always sell what they produced. The situation brought vociferous, but largely ineffectual protests not only from the corporate directors, but also from the employees.²¹³

The German revolution further complicated the situation. In the Pfalz radicals at first had little influence, as moderate socialists controlled the workers and soldiers councils. In the face of the French, a spirit of cooperation initially prevailed. BASF's directors accepted the demands of local union leaders to dissolve the company union, to negotiate with the independent unions, and hold new elections to the workers' committees. Union membership grew rapidly. Other concessions included the general introduction of the eight-hour day, the abolition of piecework, and the directors' promise to avoid layoffs by employing idle production workers on repairs and maintenance. Further negotiations produced modest hourly wage raises and an inflation supplement in March 1919, which helped to avoid much of the labor unrest that struck other local industries in early 1919.²¹⁴ In the central-German region around Leuna-Merseburg, where the radical USPD

²¹² Engere Kommission, 51. Sitzung, 52. Sitzung (May 7, 1920). E. Dauge, *Sowjet-Russland* (Sept. 2, 1920), BASF UA, A18 (1)/4/11. On the general postwar situation: Meinzer, Productive Collateral; Plumpe, IG Farbenindustrie, 99–130; L.F. Haber, Chemical Industry, 247–83.

²¹³ Meinzer, Productive Collateral, 54–5; correspondence with Auswärtigem Amt in BAL, esp. R85, Nr. 906: Friedensverhandlungen, Wirtschaftsfragen, BI. 209–10, 234, 291; Nr. 907, BI. 327, 330; Nr. 908, BI. 76, 219–22; Aufruf and cover letter from BASF employees to Reichsregierung Ebert-Scheidemann (31 Jan. 31, 1919); BASF to Ausw. Amt (Feb. 7, 1919), in Nr. 912, BI. 28–9, 97–8, 302.

²¹⁴ Patton, Flammable Material, 237–40.

was dominant and communist influence was growing, the directors conceded even more, ending overtime work, equalizing meals for workers and salaried employees, and agreeing to transfer unpopular supervisors. In the initial period the unions in Leuna made only moderate wage demands, because Fritz Haber, representing the Imperial Office for Economic Demobilization, had threatened them at the end of 1918 with halting the third phase of Leuna expansion if their demands were too high. In these discussions Haber always gave the appearance of the impartial bureaucrat, never mentioning his own financial interests. The Reich officials were prepared to offer support to the Leuna plant managers, including the use of troops or police against striking workers – for the Reich too had economic interests to protect.²¹⁵ A regional general strike in February–March 1919, which led to bloody encounters with anti-communist paramilitary “free corps,” culminated in a district settlement. The Leuna managers, along with others in the district, accepted factory councils with consultative powers, though not the demand for “socialization” that would allow extensive workers’ control of the plant. In the more moderate Pfalz, factory councils did not come until the passage of a more restricted national law the following year.²¹⁶

In spring 1919 the company experienced its first postwar strike in Ludwigshafen-Oppau, not by the workers, but by BASF’s salaried employees. The directors were shocked to find this formerly loyal group “behaving much more radically than our workers.” While demanding a flat compensatory payment of 1,500 marks per person for alleged low salaries in the past, they utilized working-class strike techniques including picketing, threats, and violent intimidation against nonstriking employees, as well as press releases designed to gain public sympathy. After a weeklong standoff, the strike ended with a negotiated compromise: the firm paid cost-of-living salary supplements, but not the compensatory payment. Although the company also refused to pay the strike days as such, it did permit the employees to count them as paid vacation days. After the adoption of the Weimar constitution in the summer of 1919, BASF also accepted regional collective bargaining agreements with both the workers’ and the employees’ organizations formed as part of the new *Reichsarbeitsgemeinschaft Chemie* in April 1919.²¹⁷

To many workers, the revolution legitimized insubordination and intolerance for arbitrary abuses of authority. In July 1919, when the directors refused the demands of the workers’ committee to dismiss an unpopular manager named Scheftlein, Oppau workers forcibly ejected him from the plant. After the management ordered a lockout and mass dismissals, the

²¹⁵ Besprechungs-Berichte (Dec. 21, 1918, Jan. 2, 1919). In BAL, R3101, Nr. 1518, Bl. 10–16, 2427 RS; R3101, Nr. 1687 (Betriebsunterstützung der Badischen Anilin- & Soda-fabrik, Dec. 23, 1919–July 22, 1925).

²¹⁶ Patton, Flammable Material, 211–13, 237–40; Breunig, Soziale Verhältnisse, 554–83; Schiffmann, Revolution, 164–5; Streller and Madfalsky, Geschichte, 32–46.

²¹⁷ Engere Kommission, 51. Sitzung, 25–27; correspondence and clippings in BASF UA, C10 (1917–20)/3, Braun, SchichtWechsel, 67; Breunig, Soziale Verhältnisse, 583–9.

workers briefly occupied the factory, demanding that it be “socialized” – under their control. The company and workers’ committee now agreed on arbitration, which reversed most of the dismissals and brought the transfer of Scheftlein. Although this seemed to be a victory for formal conflict resolution through “established channels of labor-management relations,” events over the next five years were to reveal that masses of workers preferred “direct action.” With the steadily worsening living conditions of workers during the postwar crisis, there was growing criticism of the more moderate union leaders’ cooperation with management. Many workers, especially the younger ones, believed that they could only defend their own interests and the accomplishments of the revolution through confrontation. This increased the influence of communists and anarchists on the workforce.²¹⁸

Besides the revolutionary idea of workers’ control, debates over socialization in the early postwar years included governmental controls through outright nationalization, trade monopolies, or the “mixed” enterprises promoted by Wichard von Moellendorf. To forestall efforts to nationalize the nitrogen industry or to create a trade monopoly with regulated prices as had been proposed during the war, BASF joined the “mixed” Nitrogen Syndicate (Stickstoff-GmbH) organized by Reich bureaucrats in early 1919. All the principal producers joined, both the Caro-Frank cyanamide works (including the government itself, on behalf of the state-owned factories) and the by-product ammonia producers (including the DAVV). Ongoing talk of socialization led Carl Bosch in the spring of 1921 to make one of his rare speeches, decrying socialist planning and calling for a liberal political-economic order in which individual talent and enterprise could flourish.²¹⁹

Bosch had emerged as undisputed leader of the company after the end of the war left many of his older colleagues unable to carry on. Robert Hüttenmüller died in July 1919. August Bernthsen and Julius Schuncke retired in 1918, Lothar Brunck in 1919. The departure of these men, all long associated with BASF’s traditional core branch, dyestuffs, left Bosch with a free hand to reorganize the management and shape postwar strategy. In place of the previous system of one or two senior directors and a large group of deputies, Bosch established a more collegial structure, a board of seven directors with himself as chairman. A colleague recalled him as “no friend of speechmaking. As long as he agreed with the trend of discussions, he saw no need to speak at all. When he disagreed, he expressed his opinion . . . clearly and precisely in a few short sentences.” This was usually enough “to bring about a decision on his terms.”²²⁰

²¹⁸ Patton, Flammable Material, 241–2; Schiffmann, Revolution, 174–81.

²¹⁹ Holdermann, Banne, 266–7; Gesellschaftsvertrag and Verkaufsvertrag (no date [1919]), BASF UA, C10 (1917–20)/3; Bosch, Sozialisierung und chemische Industrie (Vortrag, Verein Deutscher Chemiker, May 1921), copy in BASF UA W1 (Bosch)/5/4.

²²⁰ Schwarz, Dr. Carl Bosch (typescript, 1948), 40, BASF UA, W1 (Schwarz).

Four of the new directors (the chemists René Bohn and Paul Julius, Oskar Michel in law, and Ludwig Schuon in sales) were promoted internally, but Bosch recruited two others from agencies he had worked with during the war: Julius Bueb, Imperial Commissioner for the Nitrogen Industry in the War Office, and Hermann Schmitz (1881–1960) of the KRA. Both had been closely involved in the development of BASF's nitrate works, especially Leuna, and Schmitz had played a key role in shaping the Nitrogen Syndicate. A former director of the Metallbank in Frankfurt and a skillful financier, Schmitz rendered critical services to BASF during the crisis. After Bohn retired at the end of 1921, Bosch brought in Hermann Warmbold, former Prussian Minister of Agriculture. This completed the new team – very different from the prewar leadership – that led BASF until the fusion of 1925.²²¹

Another effect of Bosch's reorganization was a sharp increase in the number of chemists with the title of director. In early 1914 before the war, there had been only four. By March 1919 that had increased to seven. In August 1924 there were 17, albeit mostly on the level of deputy board members (*stellvertretende Vorstandsmitglieder*) or simply titular directors. Nevertheless these posts offered an important career incentive for the younger academics in a firm that had almost doubled its scientific staff since 1918. They also reflected Bosch's belief that the future of the firm depended upon scientific innovation, and that scientists as managers would be most likely to encourage such innovation.²²²

Bosch also promoted changes in the supervisory board, in order to broaden its composition and enhance BASF's links to other firms. After Crailsheim's retirement in 1919, Hermann Schmitz helped to arrange a deal bringing in two new board members, Louis Fadé of Degussa (Deutsche Gold- und Silberscheideanstalt), BASF's leading customer for liquid ammonia (used to produce cyanide), and Alfred Merton of Schmitz's old firm, the Metallbank und Metallurgische Gesellschaft in Frankfurt on the Main, a major customer for chemical apparatus that could be produced in Oppau's workshops. Another, ultimately ill-fated connection to Degussa came through the Degesch GmbH (Deutsche Gesellschaft für Schädlingsbekämpfung, or German Society for Pest Control). This was founded in 1918–19 as a not-for-profit (*gemeinnützige*) firm by Degussa, BASF, and other IG firms under the supervision of the Reich's military and economics ministries, which gave the

²²¹ Engere Kommission des AR, 50. Sitzung (Nov. 4, 1918), pt. 4; notice (Nov. 1919), BASF UA, C10 (1917–20)/4; C. Müller to AR (Jan. 18, 1922), C10 (1921–25)/3. Bemerkungen von Geheimrat Schmitz (July 16–18, 1953), BASF UA W1 (Bosch)/20/46; Schwarz, Dr. Carl Bosch (typescript, 1948), 40, W1 (Schwarz). Schmitz ultimately succeeded Bosch as chairman of IG Farbenindustrie AG.

²²² Chemiker-Listen (Januar 1914, March 1919); Chemiker der einzelnen Abteilungen (August 1924), BASF UA, C623. Hayes, Carl Bosch and Carl Krauch, 355–6.

company a national monopoly on cyanide-based pesticides as a spin-off from Fritz Haber's chemical warfare work.²²³

Further changes in BASF's supervisory board followed an agreement among the leading IG firms to exchange board members. In 1920 Bosch proposed Adolf Haeuser of the Höchst Farbwerke and Carl Duisberg of Bayer; but Carl Glaser, no doubt recalling old affronts, initially refused to consider these candidates. Rather than giving in to pressure, he announced his retirement from the supervisory board in the spring of 1920: "I am . . . too old for my office," he explained in proposing Carl Müller as the new chairman; "my way of thinking may be outmoded." Under Müller's chairmanship, Haeuser and Duisberg joined the following year.²²⁴ Until the deaths of four members in 1924–25 and the fusion shortly thereafter, the principal change in the supervisory board was the admission, mandated by law, of two representatives from the factory council in September 1922. This was a concession to demands for workers' control that lay at the center of labor-management conflicts until 1924.²²⁵

In an interview conducted with a French newspaper in 1920, Bosch voiced undiminished optimism:

The future of the chemical industry is unlimited. There is no natural product that cannot, with perseverance, be manufactured. We will direct our efforts to this goal. Dyes, with which we have been particularly occupied so far, are only one of the infinite range of branches that could attract our attention. . . . We have behind us sixty years of experience and accumulated effort. In our competitive struggle we will put special emphasis on the quality of our products, *as well as on a growing unity between our customers and ourselves.*²²⁶

With this, Bosch signaled that BASF would continue to pioneer new synthetic products, building on its Haber-Bosch technology to move from dyes to fertilizers and beyond. On the commercial front, the firm would maintain its tradition of quality and customer service, which promised success in the struggle against the inexperienced competitors that had emerged during the war. Bosch did not here emphasize the third, organizational element of the company's postwar strategy: BASF would work as closely as possible with other German companies in building a capital base and rebuilding an

²²³ Direktion to AR (July 16, 1919), C10(1917–20)/4; Szöllösi-Janze, Fritz Haber, 382–93, 455–7, 461–4. For Degesch and Auschwitz, see Part III of this book and Hayes, *Industry and Ideology*. After 1922 Degussa temporarily took over complete ownership of Degesch; not until 1931 did a new relationship emerge, as IG Farben became co-owner with a 42.5 percent share. See Kalthoff and Werner, *Händler*, 27, 80.

²²⁴ Glaser to Müller and AR (May 3, 1920); Glaser to Vorstand (March 27, 1920), BASF UA, C10 (1917–20)/5.

²²⁵ Correspondence between Direktion and AR, 1924–25, C10 (1921–25)/7–8; 219. Sitzung des AR (Sept. 23, 1922), BASF UA, C112 [all references to minutes of the full AR are from this location].

²²⁶ Cited in *Une visite à l'usine allemande de deux cent cinquante chimistes*, *Le Journal* (Jan. 24, 1920), emphasis in original.

overseas sales organization, which would eventually lead to the fusion that produced the IG Farbenindustrie AG. BASF's leaders had already recognized the necessity of this by 1919.²²⁷ BASF had unique assets in the IG. Its potential fertilizer market was ten times greater than the dye market, and none of the other companies could match its high-pressure catalytic technology as a path to new products like synthetic methanol. Though Bayer had led the wartime IG in explosives and chemical warfare agents, these offered a weak basis for postwar development, and its synthetic rubber technology still lacked commercial viability.²²⁸ By 1920, moreover, BASF had begun to deal successfully with the occupation, the treaty, and other consequences of the peace; here Bosch also played a central role.

Stark Realities of the Peace Terms: Occupation, Technology Transfer, Reparations

At the request of the German government, Carl Bosch served as a representative of the chemical industry in the negotiations following up on the Armistice, and then in connection with the Versailles Treaty. Like most Germans, Bosch found the terms of the treaty shocking, particularly the reparations and inspection provisions aimed at his own industry, and he sought – without much success – to alleviate these through negotiating with the French.²²⁹ BASF's vulnerable location left him few options. As the only larger dyeworks in Germany located on the left bank of the Rhine, the company's Ludwigshafen and Oppau works stood in a zone of continuous French occupation from the end of 1918 until French withdrawal in 1930.

The French occupation produced a variety of problems for the company. It was necessary to quarter French troops in the area, and this led to tensions between the occupying forces (many of whom were North Africans) and the local population including BASF workers. On the other hand, at times the company's management found itself depending upon French troops to maintain order among striking workers. Worse, the French utilized provisions of the Armistice and the Versailles Treaty to study the company's critical production facilities, an apparent case of industrial espionage in the name of arms control inspections. BASF had barely resumed production in early 1919, when in an effort to hold off prying investigators, Bosch ordered all plants shut down whose operation would be too revealing. The company thereby suffered substantial losses – 25–30 million marks alone from Oppau's inactivity in the first four months of 1919.²³⁰

²²⁷ Begründung eines Kapitalerhöhungs-Antrages (no date [November 1919]), BASF UA, C10 (1917–1920)/4.

²²⁸ Meinzer, Productive Collateral, 51; L.F. Haber, Chemical Industry, 129, 247.

²²⁹ Holdermann, Banne, 156–70.

²³⁰ Engere Kommission, 51. Sitzung; Meinzer, Productive Collateral, 54–55; reports of Büro Allbrecht (Jan.–Feb. 1919), BASF UA, A862/IV: Französische Besetzung der BASF.

Article 168 of the Treaty specified that all German factories for the manufacture of “any war material” were to be “closed down,” unless approved by the victorious powers. The French threatened to include BASF’s ammonia plants under this provision, unless the company licensed the Haber-Bosch technology to them. Not knowing whether the French had learned enough from their inspections to build a plant on their own, the company could not ignore these demands. During lengthy negotiations in Paris during the months after the Germans signed the treaty in July, Bosch (with the understanding of the Reich government) worked out a deal with the director of the French military Explosives Department (Service des Poudres).²³¹ Before closing the deal, however, the company needed to settle several other issues, such as the dissolution of a pooling agreement with the explosives cartel, which had been drafted in the expectation of a German victory. A key concern was the provision in that agreement prohibiting foreign licensees from producing explosives, which blocked BASF from negotiating licenses for its nitrogen patents abroad. The IG thereupon successfully pressured the explosives cartel to dissolve the contract, thus leaving BASF with a “free hand” for its ammonia licensing negotiations.²³²

A second issue was the cost of BASF’s ammonia plants. The Versailles Treaty required the Germans to deliver 30,000 tons of ammonia per year to France for three years as reparations. Under normal circumstances, BASF could have produced this quantity with ease, but the outlook in mid-1919 was not good. By November 1918 Oppau had achieved a production capacity of around 60,000 tons of pure nitrogen per year; expansion to the planned capacity of 90,000 tons was delayed as apparatus and materials went to building Leuna. There, shortages of fuel and equipment, strikes, and other problems had limited the factory’s output to 47,000 tons of nitrogen in 1918, and less than 3,500 tons more by March 1919 – far below the capacity of 120,000 tons intended from the first two phases. The third phase was supposed to enlarge capacity to 200,000 tons per year, but completing it would be extremely expensive and thus a burden to the other IG firms. Although Leuna was producing at a slight profit by August 1919, overall for the year it was still in the red, and Oppau was still producing at a loss, which necessitated raising prices that might in turn affect sales.²³³

In January 1919 BASF’s directors had met with the representatives of the Deutsche Bank’s consortium to discuss a bond issue of 50 million marks to help finance the third phase of the Leuna works, but they needed much more capital. Funds could of course come from the German government, but

²³¹ Fred Tanner (ed.), *Versailles*, 168–9; Holdermann, Banne, 169–170; L.F. Haber, *Chemical Industry*, 194. Engere Kommission, 51. Sitzung, 14–15.

²³² BASF Rundschreiben to IG (Aug. 1, 1919 and Nov. 4, 1919), and related correspondence, in Hoechst, 18/1, 21: Abkommen mit Pulverfabriken.

²³³ Meinzer, *Productive Collateral*, 55–6; Niederschrift über die Sitzung der Interessengemeinschaft [=IG] (Sept. 18, 1919), Bayer 4/B.23.

the Leuna contract of 1918 limited ammonia prices. In September Schmitz and Duisberg negotiated a revised contract to secure funding of the third building phase by a long-term loan of 232 million marks through Erka, the Reich Credit Agency (Reichskredit- und Kontrollstelle GmbH), without fixed prices. Additional funding to cover the remaining 212 million needed for Leuna could come only with strings attached: converting the Leuna works into a mixed enterprise in which the Reich might be the majority partner. To the directors of Höchst, Cassella, and ter Meer BASF's nitrogen enterprises posed a financial risk that "in the case of an unfavorable outcome, could endanger the existence of the firms of the IG." Schmitz therefore proposed creating, with the help of the banking consortium, a separate corporation to which BASF would license its patents while maintaining technical control, and he joined a commission of IG legal directors to examine the options.²³⁴

Bayer's legal director, Doermer, presented the commission's findings to a decisive IG meeting in Baden-Baden on October 10, 1919. Before the internal discussion began, an invited spokesman of the Reich Treasury confirmed the government's demand for either a majority share in a new "mixed" corporation, or the sale of the entire Leuna works to the Reich. As the commission argued in its report, either option could avoid some of the very high taxes for founding a public corporation (Aktiengesellschaft), as well as the required publication of BASF's ammonia accounts since 1917. Given the uncertain political situation, such publicity could have "undesirable consequences" for the entire IG, "precisely in regard to the socialization question."²³⁵

After the Treasury official left, the legal commission's representatives argued that selling to the Reich would be the best way to avoid the political and economic risks while recouping the IG's investments. Another director called this a "brilliant solution." Confronted with this threat to his life's work, Bosch sat in tense silence, with head down and fists clenched, according to later accounts. It was Carl Duisberg, the chair of the meeting, who sprang to Bosch's aid. Face red and voice cracking with rage, he proclaimed that to sell Leuna would be to throw away the IG's "best card"; he had never heard a "more foolish proposal." How could the lawyers know the future of the fertilizer industry, and of Leuna in particular? With markets closed off in other areas, it might well be the "salvation" of the IG. Slamming his fist on the table, Duisberg pronounced the debate closed and called for a vote, which produced a compromise. Leuna would not go to the Reich, but would become part of a GmbH (less expensive than an AG) under BASF's management. Effective January 1919, income from nitrogen fixation

²³⁴ Sitzung (Jan. 23, 1919), BASF UA, A17/1/12; Entrevue [with Solvay] (Sept. 17, 1919), Vertrag [with Reich] (Sept. 18, 1919), C10 (1917–20)/4; "for political reasons": Niederschrift über die Sitzung der IG (Sept. 18, 1919). Holdermann, Banne, 170–171; BASF Ludwigshafen to BASF Merseburg (March 28, 1919); LAM, Bestand Leuna-Werke, A1302, BI. 38–41.

²³⁵ Kommissions-Bericht (no date [Oct. 1919]); Minutes of Juristen-Kommission (Oct. 9, 1919); Niederschrift über die Sitzung der IG (Oct. 10, 1919), Bayer 4/B.23.

would no longer be reserved as a special area under the IG contract. And despite the risks, the IG firms would increase their share capital to cover the remaining costs of expanding the ammonia plants and establishing the GmbH. Because of uncertainties about whether to include Oppau along with the Leuna works, the latter was not organized in its final form, as the “Ammoniakwerk Merseburg GmbH,” until 1922. The worries about financial risk seemed to dissipate as the firm repaid its enormous government loans in inflated currency worth about 25 million goldmarks.²³⁶

With Leuna secure, Bosch completed the licensing agreement with the French on Armistice Day 1919. BASF granted to the French government exclusive rights to its processes within French territory. A French national corporation would build a plant to BASF's specifications, with an annual capacity of 100 tons of ammonia per day in continuous production, and with access to any technological improvements over 15 years. BASF had asked for 50 million francs in return; the contract gave them only 5 million (somewhat more if the capacity exceeded 100 tons) plus a small royalty per kilo of nitrogen produced during the contract period. During the French occupation of the Ruhr in 1923, outraged German nationalists accused the company of treason for yielding to French demands. In defending its actions, BASF asserted that it had acted only under duress and thus far had done nothing to help the French. True, but it was mainly French domestic politics – not BASF's inaction – that delayed for several years the formation of the company and onset of construction.²³⁷

Despite issuing no other Haber-Bosch licenses, BASF could not prevent involuntary transfers of its technology to others, such as the British firm Brunner, Mond & Co. In May 1921 this firm announced (without any prior negotiations with BASF) that it had obtained from the British government a license under the Versailles Treaty to use confiscated BASF patents to make synthetic ammonia. The British could not get the process to work until 1923, after purchasing secrets “from two Alsatian engineers who had worked at German factories during the war.” By the mid-1920s, moreover, American, French, and Italian firms developed competing processes, and world output of synthetic ammonia was growing rapidly.²³⁸

²³⁶ Niederschrift (Oct. 10, 1919); Holdermann, Banne, 170–2; Schwarz, Dr. Carl Bosch, 38–9; Engere Kommission des AR, 54. Sitzung (April 16, 1921), 17–18. Gesellschaftsvertrag (Dec. 18, 1920), LAM A1303; Chronik des Ammoniakwerk Merseburg 1916–1921, BI. 10–11; amended contract (May 29, 1922), A1321, Entwicklung des Werkes 1922; A1323, *passim*; Entwicklung des Werkes 1923, BI. 1–5. Streller and Madfalsky, Geschichte, 64.

²³⁷ Meinzer, Productive Collateral, 60–63; L.F. Haber, Chemical Industry, 237; Engere Kommission, 51. Sitzung; contract (copy), BASF UA, C10 (1917–20)/5. Direktion to AR (Feb. 19, 1923), and press release (Das Stickstoff-Abkommen), C10 (1921–25)/5. Notice to Bayer workers (Feb. 19, 1923), PRO (Kew), WO 188/757, G/21 (translation, March 27, 1923).

²³⁸ Bosch to Rathenau (June 13, 1921); Rathenau to BASF (16.6.21), BAL, R3301, Nr. 1887. Quotation from Travis, High Pressure, 13.

Similar problems confronted the company with respect to dyes. The French inspectors and control officers were able to gain enough insight into BASF's dye production operations to force the company to undertake negotiations with the French Compagnie Nationale des Matières Colorantes et des Produits Chimiques (CNMC) with a view to granting them an exclusive license to produce from BASF patents and to sell the products within France and the French overseas colonies. As with the Haber-Bosch technology, it seemed better to negotiate an agreement from which the company could profit, than to risk losing everything, or as the minutes of the Select Commission put it, "in order thereby at least to obtain an equivalent for the information that the French commissioners are obtaining by industrial espionage"²³⁹ As most IG companies were in a similar situation, they jointly negotiated an agreement along the lines sketched by BASF's directors in 1919. The Germans voided the agreement after the French occupied the Ruhr in 1923; when the French renewed negotiations after 1924, the advantage lay on the German side.²⁴⁰

Negotiations also dragged on for years with the Allied reparations commission concerning dyestuffs. The Versailles Treaty required the German chemical industry to immediately to deliver the victors half of its stocks of dyes and other chemicals, and then annually (until January 1, 1925) to sell to them up to a quarter of its dye production available for export, at prewar net prices (significantly lower than postwar prices). The Reich compensated the companies for these deliveries, albeit "generally after a long delay and at prices that fell far short of covering costs." Yet the ironic effect of such in-kind reparations was to keep German dyes in the very foreign markets from which their competitors were trying to exclude them. As a result, the British and especially the Americans exercised this provision "with restraint." In part because the Allies found the dye stocks they had initially confiscated unsuitable and dumped masses of excess stocks, a crisis hit the international dye markets in 1920. Given strong demand for products that British or French domestic manufacturers could not yet produce in good quality, especially the vat dyes and other high-quality specialty dyes, in mid-1921 the Allies modified the reparations provision by requiring the Germans to supply specific types of dyes to order. This "normalizing" provision served to mitigate the effects of reparations.²⁴¹

In the United States, despite official and unofficial harassment, BASF's prewar American importers, Kutroff & Pickhardt, had survived the war intact and were eventually able to resume their trading relationship with the company. This gave BASF an advantage over companies whose proprietary facilities had been confiscated by the U.S. Office of Alien Property. This

²³⁹ Engere Kommission des AR, 51. Sitzung, 14–15. ²⁴⁰ L.F. Haber, Chemical Industry, 275.

²⁴¹ Meinzer, Productive Collateral, 55–6; Plumpe, IG Farbenindustrie, 112; L.F. Haber, Chemical Industry, 248–9; Steen, German Chemicals, 327–31.

office also – after the Armistice – confiscated German patents and sold them to the newly created Chemical Foundation, Inc., for resale to American firms. After the conclusion of a separate peace treaty in 1921 (the United States Senate having refused to ratify the Treaty of Versailles despite President Woodrow Wilson's pleas), German companies, including BASF, could file suit for the return of their confiscated patents and lost patent royalties under Section 10(f) of the Trading with the Enemy Act. Initial German optimism for compensation here proved to be misplaced. After drawn-out and complex legal proceedings, the courts were to rule against the Germans in these cases by the end of the decade. As a result, BASF (like other German firms) could not recover its patents or its lost royalties, and indeed was required to pay royalties to the Chemical Foundation or to American firms for products sold in the U.S. that were covered by the patents it had lost. Not until a court decision in 1931 would the merged IG Farbenindustrie AG obtain some compensation directly from the U.S. government for German patents, apparently including BASF's Haber-Bosch patents, which the U.S. military had used during the war.²⁴²

After the Versailles Treaty came into force in January 1920, the French controllers left and the army ended its direct occupation of the works in March. Thereafter BASF still had to confront occasional inspections from the Military Inter-Allied Commission of Control (Mikoko, as the IG called it), established to enforce the treaty's disarmament provisions.²⁴³ The Mikoko's Chemical Section, headquartered in Berlin, had two experts who conducted most of the inspections with the assistance of Allied district control officers and German liaison officers. Moreover, the Mikoko also inspected factories in the unoccupied zone, thus including the Leuna works. The chemical inspectors completed most of their work by the end of 1922, had to suspend inspections during the Ruhr crisis of 1923, and then resumed brief follow-up inspections in 1924 before officially withdrawing from Germany in 1927. The inspectors supplemented their on-site findings with a series of questionnaires (for BASF, 25 in all), which every chemical and explosives company in Germany had to complete, detailing their wartime production of all war chemicals and explosives, supported by descriptions and enumerations of the facilities and processes to produce them. In order to limit industrial espionage, the companies gave their questionnaires regarding production processes for war chemicals (required under Article 172) first to officially appointed German experts in Berlin, including Fritz Haber's institute staff in Dahlem, who would synthesize, abstract, and summarize the information before submitting it to the Allies. BASF also obtained a legal opinion that Article 172 applied "only to chemical warfare agents" as such, not to intermediates

²⁴² Steen, German Chemicals, 332–43.

²⁴³ Kontrollkommissionen 1919–1923, BASF UA, A862/III/3; Meinzer, Productive Collateral, 55.

that could be used also for peacetime products such as dyes. BASF thus furnished the Allies with details only on its processes for arsenicals, not for the ethylene and thioglycol used in making mustard gas (and indigo). In response to repeated German complaints, the Mikoko's representatives accepted this principle at least in part, so that they did not object during their inspection of Leuna in 1924 when the directors withheld details about the new methanol synthesis.²⁴⁴

Following their inspections, the Allies of course had the right under Article 168 to order the modification or dismantling of plant and apparatus deemed to be in violation of the Treaty. The dual nature of chemical production complicated matters, however, as in the cases of ammonia and the intermediates used for dyes and poison gas. It was thus possible to justify much if not all of the wartime expansion in capacity for such products. Hence although BASF had to dismantle its first wartime "white salt" (nitrate) factory in Oppau – which was obsolete anyway – and cut its production capacity for phosgene in half by dismantling the Leuna phosgene plant, it could continue to produce phosgene for dyes in Ludwigshafen. For these losses, however, the Reich paid some compensation.²⁴⁵

Postwar Marketing and Innovation

The company's two main postwar marketing goals were to recover their lost dye markets, and to gain a strong position in the nitrogen fertilizer market. The first proved very difficult. After occupying Ludwigshafen, the French had confiscated 1.5 million francs worth of dyes, without compensation. Only a timely transfer of indigo stocks to the right bank of the Rhine just before French entry had given the company something to sell to the Dutch, Austrians, and Swiss in the first peacetime months. But in the former enemy countries, BASF had lost control of its former affiliates or was unable to do business. These countries, after "spending large sums to create a domestic dye industry during the war," would "naturally use every means possible to keep us out of the market."²⁴⁶

²⁴⁴ Schwarz, Besichtigung des Leunawerkes durch die Vertreter der Mikoko (Oct. 1, 1924), Indigo-Abteilung to Anilin-Abteilung and others (June 2, 1921), BASF UA, A862 (Wirtschaftl. Demobilmachung)/I/1-2. "only to chemical warfare agents" [emph in orig.], Isay to BASF (no date [summer 1921]), BAL, R3101, Nr. 1630, Bl. 38-39. Vorschriften für Gaskampfstoffe (BASF), Bayer, 5/A.8.1. PRO, WO 188/171: BB-Dichlorodiethyl Sulphide; WO 188/172: Diphenyl Arsenious Chloride; WO 155/63: Inter-Allied Military Commission of Control in Germany, Final report.

²⁴⁵ Correspondence of Anilin-Abteilung and Indigo-Abteilung (Jan. 1920–July 1924), BASF UA, A862 (W.D.)/I/2. VT, Die äusseren Grundlagen, 153-4; Reichswirtschaftsmin. minutes re: damages to chemical industry (Aug. 20, 1921), BAL, R3101, Nr. 1630, 171-182. L.F. Haber, Poisonous Cloud, 287.

²⁴⁶ Engere Kommission des AR, 51. Sitzung, 9-11.

A large part of the initial postwar dye production was taken up for reparations payments. Aside from these, the company encountered wide interest in its dye products in Asia and elsewhere that had long been cut off by the British blockade. For these customers, used to German quality, the substitutes offered by the wartime competitors in Japan, Britain, or the United States, even natural indigo, were no longer satisfactory. The company gleefully reported dramatic rises in prices and total sales in the first quarter of 1920 versus the annual totals for the last peacetime year, 1913: in China, 67 million versus 17 million marks; in British India, 11 million versus 3.5 million. Customers had reportedly greeted the first postwar shipments of German indigo “with jubilation,” proving “that the war was a foremost advertisement for the value of the German product.”²⁴⁷

But the jubilation proved to be short-lived. Within a year, the markets were flooded, and the excitement over German products faded in a general economic stagnation that forced major cutbacks in production. Although under these conditions BASF could still produce and sell indanthrene dyes in large amounts, running the plant at nearly 90 percent of its peacetime capacity, the levels were much lower for other products. Indigo and alizarin were down to 30 percent and 25 percent of peacetime production levels by April 1921. Rongalit had completely ceased production. Far-reaching measures would be necessary to achieve some degree of recovery, including the creation of international cartel agreements to stabilize the markets and prevent further ruinous competition. In 1919 BASF’s directors had proposed a central sales organization for the entire IG. The beginning of the postwar period would indeed have been an ideal moment to rebuild in a new form, but the IG firms were still no more willing to give up their autonomous salesforces than the old Dreibund companies had been.²⁴⁸

BASF also undertook a vigorous, sophisticated approach to marketing fertilizers, beginning with studies of the attitudes of German farmers. Although the various members of the Nitrogen Syndicate had agreed not to use negative advertising against each other, neither did BASF agree to joint advertising with the producers of Caro-Frank cyanamide, which it considered to be inferior, or of by-product ammonia. Instead it independently promoted its own products, in one case deliberately imitating a Caro-Frank leaflet (“The truth about nitrogen fertilizers: the facts prove it!”), but substituting its own name. After the syndicate prepared a general film about nitrogen fertilizers to show the “facts” to the farmers, BASF asked the Ufa company to prepare a version contrasting crops grown with BASF fertilizers and those without. More traditionally, the company issued a handsome booklet about its nitrate facilities in Oppau and Merseburg. The company set up a network of agricultural consulting centers, so that its own officials could advise farmers

²⁴⁷ Engere Kommission des AR, 52. Sitzung, 11–12.

²⁴⁸ L.F. Haber, *Chemical Industry*, 250–3, 272–5; L. Brunck, *Lebenserinnerungen*, 70–2.

directly; joined the Nitrogen Syndicate in establishing a credit agency to help farmers purchase fertilizer; expanded its Limburgerhof agricultural testing facilities and also used a beet sugar enterprise it had acquired, the Zuckerfabrik Körbisdorf, to improve its fertilizers and demonstrate their quality for marketing purposes, including use in films. In 1922 Bosch recruited Warmbold, the agricultural director, primarily with marketing in mind.²⁴⁹

BASF's growing dominance in the IG resulting from its nitrate production became evident in the total sales figures of 1919. Whereas its major partners in the IG (Bayer, Höchst, Griesheim-Elektron, and Agfa-Berlin) suffered decreases in total sales (for the first three, losses greater than 150 million marks each), BASF managed a slight gain (2,863,000 marks) to 333,499,000 marks, thereby displacing Bayer as the IG's sales leader (but when adjusted for inflation, these figures would also represent a loss; the mark lost nearly half its value in 1919). Ammonia products accounted for 59 percent of BASF's sales, up from 37 percent in 1918.²⁵⁰

During this period, the IG firms further enhanced their academic-industrial networks. Bosch led the Adolf Baeyer Society for the Promotion of Chemical Literature (Adolf Baeyer Gesellschaft zur Förderung der chemischen Literatur), organized in 1920 to provide industrial subsidies to the deficit-ridden publications of the German Chemical Society. BASF also revived and expanded its industrial research in these years, both in the traditionally strong fields of organic chemicals as well as in nitrates and other new fields. The results, measured in patent applications, were remarkable: whereas in 1919 BASF reported only 43 patents as opposed to 108 in 1913, by 1925 the number of patents the company reported had increased to 367. A significant part came from research in dyestuffs, which had almost completely stopped during and immediately after the war.²⁵¹

Enhanced academic connections paid off in April 1921 as Paul Julius recruited Kurt H. Meyer to head BASF's main laboratory. Meyer, who had worked in Haber's chemical warfare research division during the war and afterwards served as a section chief under Richard Willstätter at the University of Munich, had the excellent academic reputation that the company

²⁴⁹ "Die Wahrheit über die Stickstoffdüngung: Tatsachen beweisen!" (c. 1920 and 1921); BASF Landwirtschaftliche Abteilung, *Niederschrift der Besprechung vom 9 May [1921]* & related correspondence, BAP, 80Ba5, B7610 (Stickstoffpropaganda); B7629/30 (Marktlage und Einfuhr von Stickstoffprodukten); B7629/38 (Warenzeichen- und Wortschutz); BASF UA, A 4081: *Die Stickstoffwerke der Badischen Anilin- & Soda-fabrik*. C. Müller to AR (Jan. 18, 1922), BASF UA, C10 (1921-25)/3; Engere Kommission des AR, 54. Sitzung, 16–17.

²⁵⁰ Engere Kommission des AR, 52. Sitzung (May 7, 1920); German price level according to Zeiler'sche Umwertungszahl (Juli 1914 bis Ende 1919): July 1914 = 1.0, Jan. 1919 = 2.6, Dec. 1919 = 4.9

²⁵¹ Johnson, *Academic-Industrial Symbiosis*, 32–9; Patentabteilung Ludwigshafen, Deutsche Anmeldungen 1913–1940 (March 27, 1942); *Entwicklung der Arbeitsgebiete 1913–1940*, BASF UA, E 05/1

had sought for so long. He expanded and upgraded the facilities, recruiting a new group of research chemists to increase their numbers in the laboratory by a third, to around 40 by 1924. Meyer applied the methods of physical chemistry (including catalysis) to organic chemistry, a combination then still relatively rare in Germany. This paid off in the traditional areas of organic dye synthesis (especially the vat dyes), and in newer fields such as plastics, solvents, and dyeing aids. Organic research, albeit more closely oriented to production, also went on in the plant laboratories of the various dye departments, which in all occupied far more chemists than the main laboratory itself. This raised the question whether these large staffs were cost-effective in view of the limited dye markets, especially after currency stabilization.

The largest single laboratory during this period was not in organic chemistry at all, however. It was BASF's ammonia laboratory in Oppau, established after the war in a new building under Alwin Mittasch, who recruited several dozen chemists and a few others (chiefly physicists and bacteriologists), including a substantial number of women, to do advanced interdisciplinary research in a variety of fields, some very distant from the nitrates.²⁵² Interdisciplinary work also characterized the well-staffed agricultural testing station in the Limburgerhof, as well as the nitrogen department in Oppau (which had a dozen physicists, more than 20 percent of its staff). Overall, the number of chemists with doctoral degrees in Ludwigshafen, Oppau, and Leuna-Merseburg, as well as in affiliated sales offices, increased from fewer than 240 in March 1919 to more than 380 in August 1924. By then BASF also had more than 60 other scientists (mainly agriculturalists and physicists).²⁵³

By this time the board's attention was focused on the prospects for new synthetics based on Haber-Bosch technology. Matthias Pier, one of the chemists in the Oppau laboratory, produced a crucial innovation in 1923: a commercially workable process for synthetic methanol, using high-pressure catalytic hydrogenation in apparatus analogous to that for the ammonia synthesis. The methanol synthesis, developed on an industrial scale at the Leuna works, can be seen as a crucial stage in growth of the "technological momentum" accruing to high-pressure technology. It clearly confirmed to Bosch and his associates, especially Carl Krauch (then head of the Nitrogen Division in Oppau), the opportunities for the synthesis of other natural products that Bosch had foreseen in 1920. Methanol could serve many purposes, even as a rather inefficient motor fuel, but further research along these lines might develop a far better petroleum substitute. In 1924 Krauch ordered Pier to study the use of high-pressure hydrogenation to make synthetic liquid fuels from coal, improving a process first developed by Friedrich Bergius. After Pier's preliminary successes, Bosch persuaded the board to support full-scale

²⁵² Heinrich Hopff, Kurt H. Meyer, CXXI-VI; Reinhardt, Basic Research in Industry, 72–4, 81–5.

²⁵³ Chemiker der einzelnen Abteilungen (Aug. 1924), in BASF UA, C 623.

development. With the world fertilizer markets glutted, the company needed new uses for the idle high-pressure equipment in Leuna, which it had taken so much trouble to build. Moreover, with experts predicting petroleum shortages in the late 1920s, synthetic fuels seemed to offer an ideal solution and perhaps the “salvation” that Duisberg had predicted in 1919. BASF accordingly purchased Bergius’s patents in July 1925. But working with solid coal presented much harder problems than the gases BASF had previously synthesized. Moreover, for the requisite capital it would again have to strengthen its financial base, another reason for the fusion of 1925.²⁵⁴

Labor Conflicts and the Catastrophic Explosion in Oppau

BASF’s workforce during the postwar era first expanded, then contracted. As returning veterans flooded back into the factories following the armistice and the revolution, BASF plants of Ludwigshafen, Oppau, and Leuna rapidly enlarged their staffs. The expansion of the nitrogen plants provided additional opportunities for hiring. By April 1919 there were about 6,000 working in the Leuna plants, with another 6,900 engaged in construction. Aside from a few hundred company officials, white-collar employees, and core workers brought from Ludwigshafen, most of the workforce had to live in temporary barracks. The company gradually added to the permanent housing for its core workers, completing about 1,400 homes by the end of 1922, but as in the Pfalz, the majority of the workforce always had to find other accommodations. Employment in Leuna peaked during the inflation years with an average of nearly 11,000 production workers in 1923. The number of construction workers sharply declined after completing the third phase of the Leuna works in 1922; moreover, the recession following stabilization forced the company to cut back on further construction, including workers’ housing. Ludwigshafen-Oppau saw a similar rise and fall. The number of workers peaked in 1922, averaging about 20,500 that year, and in the hyperinflation year 1923 salaried employees peaked at an average of nearly 8,000; then both decreased, but as the number of workers fell faster, by 1925 the number of employees (about 7,000) was almost a third of the total workforce. Turnover of workers rose to prewar levels in 1920, when more than 70 percent of the workforce left; then it fluctuated at a lower level. Although there had been some expansion of company housing in the Ludwigshafen area during the early 1920s, after 1923 costs became prohibitive, and by 1925 the company effectively ceased new construction.²⁵⁵

²⁵⁴ Hughes, Technological momentum, 106–32; Stranges, Germany’s Synthetic Fuel, 150–1, 170–9.

²⁵⁵ Streller and Madfalsky, Geschichte, 48, 50, 61, 101; Patton, Flammable Material, 323; Lehmler, Einfluss der BASF, 13; VT, Mensch, 493.

The preceding sketch hardly suggests the labor crises through which the company moved during these years. Faced with spiraling living costs, culminating in the hyperinflation of 1923, many workers were driven to petty thievery. A darkening climate of violence on all sides, in part exacerbated by right-wing paramilitary groups and French-supported separatist movements in the Pfalz, heightened the influence of left-wing communists and syndicalists particularly on the younger workers. Skilled workers at the Oppau plant, especially the metalworkers, provided much of the radical leadership in these confrontations. The Leuna works proved to be an even stronger hotbed of worker radicalism. BASF's directors responded with increasingly repressive disciplinary actions intended to reassert their authority.

During the general strike against the Kapp Putsch in March 1920, the workers in occupied Ludwigshafen and Oppau remained quiet, but in unoccupied Leuna they joined in overwhelming numbers, though the factory council also kept the plant running. BASF's directors showed a lack of sensitivity for the situation of their workers by claiming that poor business conditions limited their wage concessions during the 1920 contract negotiations. Their subsequent announcement of record profits for 1919 outraged the Oppau workers, who, without the support of the unions or the factory council, demanded a doubling of their wages. When management refused to negotiate, the workers stormed the administration building and roughed up four directors, forcing them to agree to further negotiations.²⁵⁶ To help the moderate union leaders and the factory council regain control of the workers, the company granted relatively small concessions, including compensation for the government's new 10 percent wage withholding tax, while resisting the larger demands. The directors at Leuna pursued a similar strategy in the face of a wildcat strike in July and August against the wage tax. As dissatisfaction nevertheless remained, communists and syndicalists continued to attract support away from the recognized unions.²⁵⁷

Criticism of the union leadership in Ludwigshafen-Oppau for accepting the directors' wage offer led to the resignation of the factory council. The management used the subsequent strike of the Oppau gas workers as an excuse to lock out and dismiss the entire Oppau workforce; more than 1,000 were not reinstated. Because the Ludwigshafen workers stayed relatively quiet, the managers could reject arbitration and impose harsh terms, analogous to disciplinary measures already established at Höchst and Bayer in August following wage-tax confrontations there. The company rolled back many of the concessions over piecework, overtime, working conditions, and labor organizing that workers had won since November 1918. The company now sought to introduce American-style "scientific management." New "piecework offices" (*Akkordbüros*) calculated the ideal specified time

²⁵⁶ Braun, *SchichtWechsel*, 70–2; Patton, *Flammable Material*, 246–52.

²⁵⁷ Patton, *Flammable Material*, 218.

for various types of work. This increased productivity, but also increased worker resentment.²⁵⁸

In Leuna, working-class radicalism reached its peak in March 1921, when the Unified Communist Party (VKPD), which had formed from the merger of the Independent Socialists (USPD) and the Communists (KPD), declared a workers' uprising after receiving substantial electoral support in the region. The uprising collapsed after ten days of bloody clashes with security police and military units, but not until about 2,000 communist-led workers armed with machine guns occupied and barricaded the Leuna works on March 23. Police units supported by artillery stormed the works on March 29, and at least 30 workers and 1 policeman died. The police now cleared the workers' settlements, hunting down and imprisoning hundreds, while the directors dismissed the entire workforce. In the rehiring process, they carefully purged suspected radicals including all workers under 25, whose youth alone seemed inherently dangerous. Workers had to subscribe to stringent work rules, which they called "prison rules," intended to restore the authority of the directors and reverse the previous concessions in work rules and governance that the workers had won, beyond the minimal requirements of the law. The factory council was weakened, and the right of elected trustees (*Vertrauensleute*) to speak for their fellow workers was abolished along with their other former privileges.²⁵⁹ The resulting atmosphere in the works can be seen in a verse published at the time:

Better not let things upset you,
Don't dare let things offend you.
If once you speak your mind, pal,
You've just become too 'radical';
You'll see there is no finer,
Faster way out of 'Leine'!²⁶⁰

On the morning of September 21, 1921, one of the worst industrial disasters in history occurred with the explosion of a fertilizer silo building (Op 110) at the Oppau plant. The noise of the enormous blast echoed as far as Munich, halfway across Germany. More than 550 people died, and a large part of the Oppau complex was damaged as well as many of the buildings in the surrounding area. Dozens of workers' homes in the community of Oppau itself were destroyed. Where the silo had stood, there was a crater

²⁵⁸ Schiffmann, Revolution, 208–10; Patton, Flammable Material, 253–7; VT, Chronik, III, 790–2.

²⁵⁹ Engere Kommission des AR, 54. Sitzung, 29–30; Patton, 219–23, 226–7; Streller and Madfalsky, Geschichte, 56–63.

²⁶⁰ "Du darfst dich nicht erbosen,/ an nichts darfst du dich stoßen./ Redst du ein deutlich Wort einmal,/ so bist du gleich zu 'radikal';/ man bringt dich dann auf feine/ und schnelle Art aus 'Leine' [i.e., Leuna]!" Leuna! In: Klassenkampf, Nr. 134 (12.6.23). Copy in: LAM: Bestand Leuna-Werke, A 1323, Bl. 91.

100 meters wide and 20 meters deep, which quickly filled with water. The extent of destruction, and the deaths of all those in the silo at the time of the explosion, made it impossible to reconstruct exactly what had led to the explosion, despite extensive investigation.²⁶¹

The rescue and aid operations after the explosion were marked by cooperation between the company and local authorities, as well as between Germans and the French occupying forces. Two days after the disaster, BASF worked out a six-point plan for aid to the victims and survivors. At the same time, the company sought to correct earlier reports in the press that the Oppau factory was totally destroyed. The ammonia and ammonium sulfate factories were only lightly damaged; above all, the explosion had nothing to do with the Haber-Bosch technology. At the funeral on September 25, Bosch commemorated the victims in a solemn and moving speech, stressing the mysterious and tragic nature of the disaster and promising to do all that was possible to comfort the survivors and to rebuild the plant. “The very material that was destined to create nourishment and bring life to millions in our country . . . has suddenly proven to be a savage foe, for reasons we do not yet know.”²⁶²

Internal estimates set the damage to plant and equipment at no less than 570 million inflated marks. Less than a third of this total was covered by insurance, including the IG’s recently established self-insurance company Pallas GmbH. The IG’s insurance commission subsequently concluded that distributing the risk and relying on the model construction techniques and safety measures of the IG’s companies would make self-insurance pay off in the long run, despite the costs of the Oppau catastrophe. In the short term, to cover these costs, the IG firms issued about 10 percent more stock, which increased BASF’s share capital (*Stammkapital*) by 40 million marks. By distributing risk to the rest of the IG, the company had substantially mitigated its losses.²⁶³

Investigative committees in the company, the Bavarian government, and the Imperial government undertook the long, frustrating work of trying to understand how a supposedly inert fertilizer had exploded. The BASF established a special department, the “Abteilung Exo” (for Explosion Oppau) to coordinate its internal investigations and to deal with the public and government authorities. The western Allies launched their own undercover investigations, which confirmed that BASF had not been secretly producing military explosives. Public speculation raised every possibility, including

²⁶¹ Technical literature and Gutachten of Chemisch-Technische Reichsanstalt (Nov. 30, 1921), BASF UA, A832; press reports, A832/I; official Gutachten from Reichstag investigation, Hilfswerk Oppau (1925), A832/II.

²⁶² Explosionsunglück Oppau and press release (Sept. 23, 1921), BASF UA, A832, 9/II/5, 24. Quotation from Holdermann, Banne, 182–6.

²⁶³ 214. Sitzung des AR (October 4, 1921); 216. Sitzung des AR (December 13, 1921).

a nuclear explosion!²⁶⁴ There was in fact an indirect military connection. One of the components of the exploded fertilizer was ammonium nitrate, which the company had produced for the military during the war. In order to continue producing the substance as a peacetime product, BASF combined it with ammonium sulfate to make a nonexplosive fertilizer. After extensive testing, the company's scientists reported in 1919 that the combination would be safe, as long as concentrations of ammonium nitrate stayed below 55 percent. Normally this combined fertilizer, which hardened into a rock-like mass after being sprayed into the silo for storage, was unaffected by the small explosive charges used to break up the mass to prepare it for shipping. Since the war some 20,000 such detonations had been carried out without a problem. What went wrong this time? BASF ultimately concluded that the explosion probably resulted from an incorrect mixture of ammonium sulfate and ammonium nitrate, which had been stored only in the silo where the explosion took place and which the relatively primitive testing and quality control techniques of the time had missed. In any case, Bosch told the plant managers in Oppau on the day of the explosion that they would make no more ammonium nitrate. Not until two decades later, under much safer conditions, did the company again produce this fertilizer.²⁶⁵

From the beginning, BASF's leaders insisted that as they had done all the necessary tests to show that their fertilizer was not explosive, the explosion was not due to negligence. The company thus bore no legal responsibility for it, or for the damages to the surrounding communities, estimated at 100–200 million marks, some 40–50 million in Oppau alone. Ninety-three families who had lost their homes were allowed to live temporarily in recently completed company housing. A mitigating factor was that many of the private homes had been insured against damage from explosion during the war. Aside from this, the company's directors rejected all legal liability claims. In March 1922 Bosch and other representatives of BASF met with the technical expert of the Imperial Court, who advised them that by cooperating fully, they might not be declared liable, in view of the fact that the ammonia plant was not inherently dangerous. Without assuming responsibility, the company ultimately agreed to a settlement whereby it voluntarily paid compensation to victims and survivors. In doing so it differentiated between compensation to the families of its own dead and injured employees, which the company had immediately promised to compensate with (rather

²⁶⁴ Steppes in *Der Proletarier* (Dec. 1921), and various reports, BASF UA, A832. Chemical Research Board, DSIR: investigation of explosion at Oppau Factory, Sept 1921, PRO, WO 188/382–386.

²⁶⁵ Rudolf Heintze, Ursachen für Oppauer Düngerexplosion (Sept. 27, 1991), BASF UA, A832/I; CTR Gutachten (Berlin, Nov. 30, 1921), A832; Wawersik (Düngemittel) to ZOA/MU (July 22, 1996), BASF UA, A832/III; Borchardt, Erinnerungen an Dr. Carl Bosch (February 4, 1952), W1 (Bosch)/20/6.

modest) one-time payments as well as pensions for widows; and nonemployees, who were not its legal responsibility, but who did receive some aid. More than half of the victims had not been directly employed by the company, but were working for construction or shipping firms. To assist the community, the company also contributed a substantial sum to the Hilfswerk Oppau, the organization established to assist the victims' families and promote the rebuilding of Oppau.²⁶⁶

In the hyperinflation, unfortunately, compensatory payments rapidly became worthless. In the settlement, the company had agreed to provide to nonemployees compensation of 10,000 marks per person, to which BASF added 10,000 more for a total of 3.4 million marks. By the fall of 1922, 20,000 marks had a goldmark value of only \$41.67. BASF nevertheless denied all requests for additional compensation during the inflation period; in accordance with its agreement with the government, it regarded the Hilfswerk as responsible for compensating the injured. Only in a few "especially needy cases" would the company add to its voluntary payments, "without establishing any legal basis for further obligation." The company's representatives insisted that it could afford no more "voluntary compensations."²⁶⁷ After currency stabilization in 1924, the Hilfswerk Oppau did pay supplementary compensation to nonemployees of the company, who thus recovered some of their losses from the hyperinflation. Later, the company also provided some additional compensation to those who had suffered debilitating injuries and to the parents of young men who had died. As these agreements could not satisfy everyone, they long remained a source of discontent and mistrust toward the firm.²⁶⁸

For a long time thereafter wild misconceptions about the explosion continued to circulate, appearing in odd places; decades later, an Australian newspaper reported that Oppau, both town and factory, had been totally destroyed by the explosion of a secret store of German munitions, leaving nothing but a grassy mound. "As none of the survivors would return to the spot, the town was rebuilt on a new site." Some heavily damaged buildings in the town were indeed demolished, especially those on Au Strasse, the cross street nearest the explosion. This street was, however, replaced by a

²⁶⁶ 214. Sitzung des AR. Abteilung Exo (March 25, 1922), Bericht... Düringer, BASF UA, A832, 9/II/5, 24. Die Oppauer Verlustliste and Die Fürsorgenmaßnahmen der Fabrik (showing one-time payments of 2,000 paper marks to families whose breadwinners had died), *Werkzeitung*, 9 (1921), Nr. 10 (Oct. 1921), 153–7, 158, copy in BASF UA, A832/III.

²⁶⁷ Bureau Dr. Michel to Bosch: Besprechung mit zwei Abgeordneten des Bundes der Oppau-Beschädigten am 14.ds.Mts. (Oct. 16, 1922), and Abfindung der Oppau-Hinterbliebenen und -Verletzten (Oct. 31, 1922), in BASF UA, A832, 9/II/5, 24; Explosion Oppau 1921.

²⁶⁸ Bürgermeisteramt Oppau to Staatsminister Stützel, München (April 20, 1927), in Op. 1901 (1926–27); see also Op. 1907 (1922–1926), in SALU; newspaper from 1929 in BASF UA, A832/I.

completely new ring street lined with houses more solidly built than those that had been destroyed, so that Oppau gained in some ways from the calamity. Moreover, under Krauch's direction, BASF quickly rebuilt the factory; by early 1922 it was again in full production.²⁶⁹

The inconclusive investigation, coupled with the fact that neither the Bavarian or Reich government nor the company formally accepted responsibility, left the community of Oppau worried about what might happen should another similar disaster occur. Despite the fact that the ammonia factory itself had not exploded, Oppau's mayor protested the resumption of ammonia production and demanded assurance of compensation for future explosions. Despite "the very nervous mood of the local population," the Bavarian government dismissed these demands. All of BASF's building requests complied with official regulations and were clearly designed to "minimize recognizable threats of accidents or ill health." In order to promote industrial development, they were to be permitted.²⁷⁰

The catastrophic explosion revived radicalism at Oppau, in part because "most workers believed" that the piecework system had contributed to the disaster, but moderate union leaders refused to raise it as a significant issue in the investigations. Communists won control of the factory council in March 1922, and in November three council members defied management by attending a communist-organized national conference of factory councils. Their dismissal, and the directors' rejection of arbitration, led to a major strike that spread to 14 firms in the region. Shunned by more moderate unions and the city government, the strikers were forced to capitulate in mid-December on terms dictated by BASF's directors. Again the directors purged some 1,300 strikers, while further tightening work rules.²⁷¹

Yet in 1923 radicalism revived once more in the wake of the renewed occupation by the French, who briefly supported the syndicalists in Ludwigshafen. Unsettled conditions lasted well into 1924 and affected the situation at BASF as well.²⁷² The currency stabilization produced an economic downturn, wage cuts, and a decision by the Reich government to permit a longer workday, which in turn led to new unrest. After a national arbitration board confirmed the new policy, BASF introduced the nine-hour day in March. The communist Industrial Union (Industrieverband) in Ludwigshafen-Oppau responded with a protest strike. The union leaders

²⁶⁹ Explosion at Oppau: Day the Rhine was Filled with Thunder, *The News* (May 23, 1961), BASF UA, A832/I; photos and plans in Hilfswerk Oppau (1925), A832/II; Hayes, Carl Bosch and Carl Krauch, 358.

²⁷⁰ Bezirksamt Frankenthal to Regierung der Pfalz (August 5, 1922); Bürgermeisteramt Oppau to Bezirksamt Frankenthal (Aug. 2, 1922); Bertram to Regierung der Pfalz (Sept. 1922), in SALU., LUA 1810, Bl. 6, 10–16, 26.

²⁷¹ Patton, Flammable Material, 261–73; Braun, SchichtWechsel, 74.

²⁷² Patton, Flammable Material, 277–279; Schiffmann, Revolution, 323–327.

realized that the situation was probably hopeless, but they could not simply accept the extension of the working day. As their leaflet proclaimed, “thousands of colleagues will be fired, wages . . . reduced and the economic and social emergency will become infinitely worse!”²⁷³

The majority of workers refused to work the ninth hour. When BASF’s management locked them out, violence erupted and two workers were killed. By focusing on bread-and-butter issues rather than ideology, the communists won widespread public sympathy and support from about two-thirds of BASF’s labor force. The strikers obtained money and food from fellow workers, farmers, and even businessmen. Noncommunist unions, local and Bavarian officials, and even directors of other IG firms urged compromise, but BASF’s directors were determined to crush the local revolutionaries and thus refused to negotiate. They announced that the plant would reopen when enough “volunteers” agreed to work a nine-hour day. After weeks of hesitation, the Bavarian government declared the strike illegal, as the French also decided not to exploit the strike for their separatist policy. The strikers’ support dwindled, but a core of 2,500 workers refused to sign back with the company. When the factories reopened on May 9, management purged 300 more alleged communists.²⁷⁴

In Leuna both management and workers had closely watched the situation in the Pfalz. Despite the tighter security since 1921, there were still many communist sympathizers among the Leuna workers. Tensions peaked following the dismissal of some 2,000 workers after a one-day strike in August 1923, and again after an explosion in the new methanol plant (Me 106) killed 7 and injured 47 in January 1924. Fearing that a longer workday would lead to more accidents, 95 percent of the workers voted against it in February, and in April 1924 communists won a majority on the factory council, not least by campaigning against the longer workday. Yet they did not risk a strike when the management, with government support, introduced the nine-hour day on June 1.²⁷⁵

The hesitancy to strike can be best understood in the context of sharply increased productivity, which reduced the demand for workers at Leuna. In 1925 their numbers fell by about 1,000, to under 10,000, despite the continued expansion of the plant. In Ludwigshafen and Oppau the situation was worse; following the purges of strikers and the company’s efforts to increase productivity, the workforce decreased from a peak of 21,600 in 1922 to below 15,000 in 1925. Thousands of disillusioned workers dropped

²⁷³ Flugblatt der Industrie-Verband der Chemie (3/24), in: Braun, SchichtWechsel, 86.

²⁷⁴ Patton, Flammable Material, 93–4, 279–87; Schiffmann, Revolution, 330–65; BASF Vorstand to AR (May 5, 1924), BASF UA, C10 (1921–25)/6. BASF to AR (March 6, 1924), A. von Weinberg to Duisberg (March 14, 1924), in Bayer 5/A.3; BASF Aufsichtsrat – Allgemeines.

²⁷⁵ Patton, Flammable Material, 227–9; Streller and Madfalsky, Geschichte, 69–71.

out of unions and abandoned political activity. The revolutionary era was over.²⁷⁶

From Crisis to Fusion (1922–1925)

Serious financial crisis began to loom in late 1922, as the accelerating inflation forced the company to increase its nominal capital by issuing additional shares of stock. The supervisory board agreed to double the capital from 440 to 880 million marks in common stock, and similarly approved a doubling of preferred stock to 60 million. Calculations of profit and loss in hyper-inflated currency became increasingly difficult and ultimately meaningless, though the directors did calculate a closing balance for fiscal year 1922 that included a net profit at the absurd level of 3.9 billion (U.S. billion) marks, versus the previous year's figure of 165.3 million. The company used the 1922 profits mainly to issue dividend payments, including a one-time superdividend of 296 percent. By this time the company had concluded an agreement with the Reich government regarding wage subsidies.²⁷⁷

As inflation spiraled out of control in late 1922, the German government suspended reparations payments. In January 1923, the French occupied the Ruhr to extract reparations in kind, and the country dissolved into crisis that eventually struck BASF as well. French troops once again entered the works on May 15 as part of their effort to secure "productive collateral." The directors, having been forewarned, escaped over the Rhine; but the French arrested three deputy directors, whom they held hostage while confiscating stocks of dyes and wood from Ludwigshafen, then (after moving over to the ammonia plant on May 29) fertilizers and other materials from Oppau. Aside from the chemicals, the French confiscated building materials to assist in the reconstruction of homes in the areas destroyed during the war. There was apparently no violence. In accordance with the official policy of passive resistance, however, none of the Germans cooperated with the French authorities. Accordingly, on August 10 a French military court in Landau convicted the company's board of directors in absentia for refusing to supply the necessary electric power to assist the French in removing nitrates from Oppau. The sentences, 8–10 years' imprisonment, were never actually imposed because the directors remained out of French hands. Production in both Ludwigshafen and Oppau, however, remained shut down until negotiations in October produced an agreement by BASF to cooperate with the French authorities "in good faith, provided that nothing is asked of us which

²⁷⁶ 6 Patton, Flammable Material, 227–9, 287–90, 321; VT, Mensch, 493; Aufsichtsratssitzung vom 10. September 1924, BAP, 80Ba5, B7611.

²⁷⁷ 219. Sitzung des AR (Sept. 23, 1922); 221. Sitzung (May 9, 1923); 217. Sitzung (April 19, 1922).

would be incompatible with our national honor." Production could begin again; the French withdrawal came later.²⁷⁸

Because the government could not print money fast enough to keep up with the accelerating devaluation of the mark during the last year, Schmitz arranged with the Reichsbank to have BASF issue its own "Aniline Dollars," which circulated as acceptable currency backed by corporate bonds and foreign deposits. Toward the end of 1923, the German government finally achieved currency stabilization by issuing the *Rentenmark* (RM, later called the Reichsmark), based not on gold but on the value of German land. The inflation was over, but only after the old mark had fallen to a trillionth (European billionth) of its original value. The period of easy repayment of debts was also over, followed by recession and unemployment.²⁷⁹

In view of the situation, the company found it impossible to assign any dividend at all in 1923. Later calculations showed that the company had lost 13.3 million RM worth of dyes and 10.6 million worth of nitrates to the French, as well as 6 million RM in other materials. Further losses in 1923–24 resulted from the French-imposed "Micum Agreements" (after the Mission interallié de Contrôle des Usines et des Mines, or Interallied Mission for Control of Factories and Mines) in November 1923, which required the company to ship 19.2 million RM in dyes and nitrates as additional reparations; the need to accommodate to these demands was one of the justifications for the longer workday. The company estimated damages resulting from the French actions at about 52 million goldmarks, for which by 1925 the Reich had partially compensated the company. Meanwhile, international agreements created a new modus for reparations payments in late 1924, dissolving Micum. Under the new Dawes Plan, German firms provided more than 26 million goldmarks' worth of chemical reparations to the Allies in 1925.²⁸⁰

Despite all the crises, total sales in 1923 turned out to be only 18 percent lower than in 1922. Dye sales were mixed, as gains in the sulfur and alizarin branches almost compensated for losses in aniline and indigo. The worst losses came in the intermediates, inorganic products and especially nitrogen. The latter's drop of nearly 44 million goldmarks, about 22 percent lower than 1922, was more than 80 percent of the company's total decrease in sales. The declines had been bad in Western and Central Europe, worst of all in Germany and the United States; only in hitherto less significant markets

²⁷⁸ Cited in Meinzer, Productive Collateral, 59, from BASF Juristische Abteilung to AR (Oct. 25, 1923), in BASF UA, A862/II.

²⁷⁹ Illustrations in Braun, SchichtWechsel, 64; Streller and Madfalsky, Geschichte, 86; Bemerkungen von Geheimrat Schmitz (July 16–18, 1953).

²⁸⁰ Meinzer, Productive Collateral, 59–61; Eyck, History of the Weimar Republic, I, 324; L.F. Haber, Chemical Industry, 249, 224. Sitzung des AR (Sept. 10, 1924); Aufsichtsratssitzung (Sept. 10, 1924), BAP, 80Ba5, B7611.

of Eastern and Northern Europe, Asia, and Latin America were some bright spots. During 1924, dye sales continued to recover. By September production of aniline dyes and indigo, no more than half of prewar levels in late 1923, had recovered to at least 90 percent of those levels. Alizarin red and the indanthrenes showed even greater success, considerably surpassing prewar production levels and necessitating a cautious expansion in plant. Yet the value of sales in the nitrates branch was still more than twice that of dyes.²⁸¹ Since 1920 BASF had even conceded a majority share to Höchst in indigo; only in the still relatively small alizarin group (less than 7 percent of the IG's sales, including the indanthrene fast dyes), did BASF hold a clear lead in sales with a share of more than 45 percent. But these were minor issues. Adding its sales of nearly 160 million goldmarks (RM) in ammonia and nitrates to its sales of nearly 91 million in other products in 1923 gave BASF a total of nearly 250 million, versus the second-ranking Bayer's 96 million goldmarks.²⁸² Thus BASF owed its leading position in the IG to its nitrate fertilizer division.

With stabilization at the end of 1923 money became extremely tight, and many construction projects had to be delayed or canceled. It also became necessary to deflate the company's share capital in the ratio of 5:1. Each share with a paper value of 1,600 old marks would be replaced by two of 160 RM each, and the total value of share capital would become 177.2 million RM, including 1.2 million in preferred stock. The stockholders had been extremely worried about the failure to pay a dividend in 1923, which had been a hard blow to middle-class small stockholders who had lost their savings in the inflation. The newly revalued common stock earned a total dividend of 8 percent for 1924 out of the company's net profits of 14.9 million RM, not including 3 million set aside as a special jubilee welfare fund for the officials and workers in celebration of the 60th anniversary of the company's founding.²⁸³ By the end of that jubilee year, however, the old BASF no longer existed.

Stabilization had also increased the pressure for restructuring the IG. In December 1923 Carl Duisberg incisively critiqued its existing limitations and proposed reforms designed to limit the tendency for each firm to pursue its own interests at the expense of the group. With market exclusions in America, England, and France, as well as the overall reduction of the global market, the IG firms "would have to content themselves with at most 50 to 60 percent of their prewar production levels." They would need to do

²⁸¹ Aufsichtsratssitzung (Sept. 10, 1924), BAP, 80Ba5, B7611.

²⁸² Die Umsätze der Interessengemeinschaft im Jahre 1923, BASF UA, A17/1/7.

²⁸³ Duisberg, Kritische Betrachtungen über die... Interessengemeinschaft der deutschen Teerfarbenindustrie (Dec. 16, 1923); 226. Sitzung des AR (Nov. 28, 1924; 227. Sitzung des AR (May 14, 1925); G. v. Müller to Bosch (Nov. 7, 1924) and other correspondence in BASF UA, C10 (1921–25)/6–7.

everything “humanly possible” to reduce costs, if possible to below prewar levels. He recommended “downsizing excessive staff” as well as consolidation within the IG’s management, above all in sales, where eight competing sales organizations abroad produced “the worst cancer in the IG.” The IG also needed to find new sources of financing in order to bring their production facilities up to date and regain their former independence from the banks. Yet Duisberg still wanted to retain the basic pooling structure, which he now believed to be better suited to German individuality than the American-style trust he had advocated 20 years earlier.²⁸⁴

Bosch meanwhile, like Duisberg of two decades before, returned from an extended trip to the U.S.A. in late 1923 with fresh impressions of American business that inclined him toward fusion. A single, unified corporation not only seemed the best solution to the problems Duisberg had identified, it would also provide the best foundation for developing big, expensive projects like synthetic fuels. Further consolidation in the latter area came in September 1924, as the IG purchased 35 percent of the share capital in the Rheinstahlwerke, which owned coalmines that could cover the IG’s needs for the foreseeable future. Bosch’s plans called forth some skeptical voices within BASF’s supervisory board, such as Gustav von Müller, who feared the bureaucratization associated with a giant enterprise, with a widening gap between the top leadership and the “official classes (*Beamtenklassen*).” Bosch also encountered skepticism among the smaller firms and of course in Carl Duisberg, who argued vigorously for his own, carefully articulated but less far-reaching proposals. After a delay due to Bosch’s illness in the spring of 1925, the directors of all the IG firms had by May 1925 agreed in principle to his idea of a merger. The key argument was that the old IG was a contractual partnership (*Gesellschaft des bürgerlichen Rechtes*) that any member could dissolve at any time. Should dissolution occur, a possibility increased by recent changes in the cartel law, the partial consolidations Duisberg had proposed would leave all the members, especially the smaller firms, in a weaker competitive position. Creating a holding company, which Duisberg proposed in October 1924, was too expensive as an alternative to merger. Hence Bosch’s path seemed better, especially after he stressed an evolutionary approach to the new corporate structure: “initially there will be no change in the organization of individual works, which will remain intact as branches.” As a further concession to tradition, Bosch reluctantly accepted the name, “IG Farbenindustrie Aktiengesellschaft.”²⁸⁵

²⁸⁴ Duisberg, *Kritische Betrachtungen*; Bayer, Anträge (no date), BASF UA, C10 (1921–25)/6.

²⁸⁵ Direktion der BASF to C. Müller (Sept. 24, 1924); G.v. Müller to Bosch (Nov. 7, 1924); L. Brunck to C. Müller (Nov. 16, 1924); BASF (Julius, Michel) to G.v. Müller (April 8, 1925); Direktion der BASF, interim report to AR (May 14, 1925), BASF UA, C10 (1921–25)/7; quotation from unsigned memorandum [by Bosch] (Feb. 24, 1925), BASF UA, A20/2. Holdermann, Banne, 201–7.

In the supervisory board meeting of October 28, 1925, Carl Bosch announced the conclusion of the fusion negotiations, and the new contracts were approved. BASF would take over the capital of the merging firms from the old IG, thus increasing its share capital from 176 million RM to 465 million RM in common stock, and from 1.2 to 3.2 million RM in preferred stock. Its corporate headquarters would move to Frankfurt on the Main. Thirty-nine new members from the various contracting firms joined BASF's existing supervisory board to form the new corporation's board; the group thus became too large for practical purposes, necessitating the creation of a new administrative council (Verwaltungsrat), like BASF's old Select Commission, to manage its affairs. The chairman would be Carl Duisberg. BASF's board of directors would expand by 32 regular members and 33 deputy members, with Carl Bosch continuing as chairman. After approving the merger in November, the last stockholders meeting ended with a vote to retain the traditional name "Badische Anilin- und Soda-Fabrik" for the Ludwigshafen branch of the new corporation.²⁸⁶ The new "IG. Farben," with the old BASF as its largest single component, could now legitimately claim to be the leading chemical corporation in the world. Yet could any of those who shaped it have imagined the tumultuous fate that awaited their creation?

²⁸⁶ Signed copy of IG contract (no date [1925]), BASF UA, A21/2. Direktion der BASF to C. Müller (Nov. 24, 1925), C10 (1921–25)/8. 229. Sitzung des AR (Oct. 28, 1925).

III

From the IG Farben Fusion to the Establishment of BASF AG (1925–1952)

Raymond G. Stokes

I. INTRODUCTION

The establishment of IG Farbenindustrie AG in late 1925 by BASF and other major German chemical companies set the stage for one of the most tumultuous eras in German industrial history. Buffeted throughout its existence by severe economic and political upheaval, IG Farben was nonetheless large and powerful enough to determine its own fate and to help shape that of its country. For that reason alone, it must be held partly responsible for the fact that what began in 1925 with great promise ended ultimately in disaster.¹ Critical examination of this co-responsibility will therefore be one of the main areas of focus in this section of the history of the firm.

But it is nevertheless important to make one point clear at the outset: Except in a fairly narrow technical sense (which will be explored further in the next section), during the period from 1925 through 1945, BASF was *not* IG Farben. Rather, it was simply one of the concern's major works groups (*Betriebsgemeinschaften*). This might seem to be stating the obvious, but it is nonetheless worth highlighting because of some of its implications. After all, most of the extensive scholarly and popular literature on the German chemical industry during this period – and virtually all of it that focuses on the Nazi years – deals almost exclusively with IG Farben.²

Consequently, this portion of the book aims to extend the existing literature by offering a focused and sustained exploration of the relationship between BASF and IG Farben from 1925 to 1945. It will also examine the systematic undoing of that relationship during the seven years after war's

¹ For scholarly general overviews of the history of IG Farbenindustrie AG, see Hayes, *Industry and Ideology*; Plumpe, *Die IG Farbenindustrie AG*. Other general overviews include, from the perspective of one of the leading figures in the corporation's development, ter Meer, *Die IG Farbenindustrie*; and, from the perspective of one of the Nuremberg prosecutors, Borkin, *The Crime and Punishment of IG Farben*.

² See the literature in note 1. There are exceptions to this rule, such as Schuster, *Badische Anilin- & Soda-Fabrik AG*; Steinert, *Im Reiche der Chemie: 125 Jahre BASF*, although they are not very detailed or extensive. The BASF corporate archive has also produced a series of small, but very useful volumes centering primarily on technological development at the concern's plants and laboratories. See, for instance, the volumes by Mach and von Nagel listed in the bibliography.

end. In the sections that follow, therefore, the primary focus is on two inter-related questions:

- 1) To what degree did inclusion in IG Farben alter the long-standing corporate culture of BASF (or the Upper Rhine works group, as it came to be known)?
- 2) To what degree did preexisting and continuing aspects of BASF corporate culture place their stamp on the emerging corporate culture of IG Farben?

BASF in the IG Period: Overview and Initial Hypotheses

One of the most difficult problems associated with investigating the relationship between BASF on the one hand and IG Farben on the other is one of definition. After all, owing to commercial, technological, and organizational developments during the 1920s and the 1930s, the shape of the former BASF – which included the main plants at Ludwigshafen, Oppau, and Leuna – changed fairly dramatically. Two key developments were especially important. First, owing to its growing size and importance, the Leuna works, which from its founding in 1916 was closely associated with the core BASF factories in Ludwigshafen and Oppau, became more and more independent from its former parents, especially in the context of the establishment of the IG concern. Second, the establishment during 1929–30 of a divisional structure within the IG, the so-called *Sparten*, had massive implications for the shape of the factories of what became known as the Upper Rhine works group. Set up along product lines and technological interrelationships, the IG's three divisions placed the original BASF plant at Ludwigshafen in a separate group (*Sparte II*) from Oppau and Leuna (*Sparte I*).

At the same time, however, relations among the three remained close for historical as well as other reasons. The complexity of the relationships is perhaps best exemplified in the statistical reporting of the factories, the divisions, and the IG as a whole during the period. Ludwigshafen and Oppau, for instance, were physically close to one another, had been conceived as complementary units in the pre-IG period, and grew together spatially over time. They therefore reported statistics on numbers of workers jointly. Each of the former BASF's factories, however, reported its production output separately, whereas investment and research and development (R&D) were accounted for by division, or *Sparte*. Crucially, though, technical and scientific personnel were reported for the Upper Rhine group as a whole, including Ludwigshafen, Oppau, and Leuna-Merseburg, and this reporting eventually extended to associated plants, including Schkopau and Hüls.

In addition to the complexities posed by the growing independence of Leuna and the establishment of the IG's divisional structure, the centralization

of a number of functions, in particular sales and the reporting of profits, led to substantial changes in the nature of the group. This effect, too, is indicated strongly by statistical reporting. Profits, in particular, seem virtually impossible to disaggregate from the figures for the concern as a whole, although there are some relevant estimates dating from the post-1945 period. Similarly, statistics on sales by BASF factories can be located for some products, but not for all. Reasonably reliable estimates of the overall revenue of BASF's Ludwigshafen and Oppau factories during the IG period do, however, exist. They enable a general overview of trends from 1925 to 1952 and, combined with figures on IG Farben revenues as a whole, provide a snapshot of the commercial development of BASF's core factories on the Rhine between 1926 and 1944 (see Figure III.9).

The trend in revenue from 1925 to 1952 is noteworthy first for its extreme volatility. Turnover in the peak year of 1943 was well over five times as large as revenue in the year of lowest turnover just three years later in 1946. But there were peaks and valleys, and sometimes violent fluctuations, throughout the period. Second, the revenues in BASF's worst financial year during this period, 1946, were less than 10 percent less than those in its second worst financial year, 1932. This comparison suggests that the Depression had almost as much impact on the fortunes of the group in the short term as did the loss of the war. Third, the first major steep rise in revenues occurred between 1936 and 1944, confirming a close correlation between BASF's fortunes on the one hand and rearmament and war on the other. Finally, there was a second, very steep rise in revenue for the firm beginning in 1949, for reasons that will be explored later. The noteworthy fact in this context, however, is that revenues for 1951, which ranked number two overall for the period in question, were nearly 90 percent of those for the overall peak year for earnings, 1943. Moreover, the earnings for 1951, just six years after the war, were in Deutsche Mark, whereas those for 1943 were in heavily regulated (and inflated) Reichsmark. The 1951 figure therefore marked an astonishing level of performance, indicating rapid recovery from wartime destruction and documenting a sound basis for future growth as BASF prepared for its refounding in 1952.

But these figures need to be put into some sort of perspective since they indicate only absolute performance levels at BASF over time without reference to any other firm or unit. What about the economic and commercial development of BASF relative to the IG as a whole? Also, might analysis of these trends over time indicate some critical areas of inquiry for further study of the IG's impact on BASF corporate culture?

Overall, during the IG period, the core Upper Rhine group factories on the Rhine were responsible for just over 21 percent of the IG's revenue per year (see Figure III.10). But this proportion varied considerably over time. The years from 1927 to 1944 can be divided fairly clearly into two phases, 1927–36 and 1937–44. In the earlier time frame, the former BASF factories

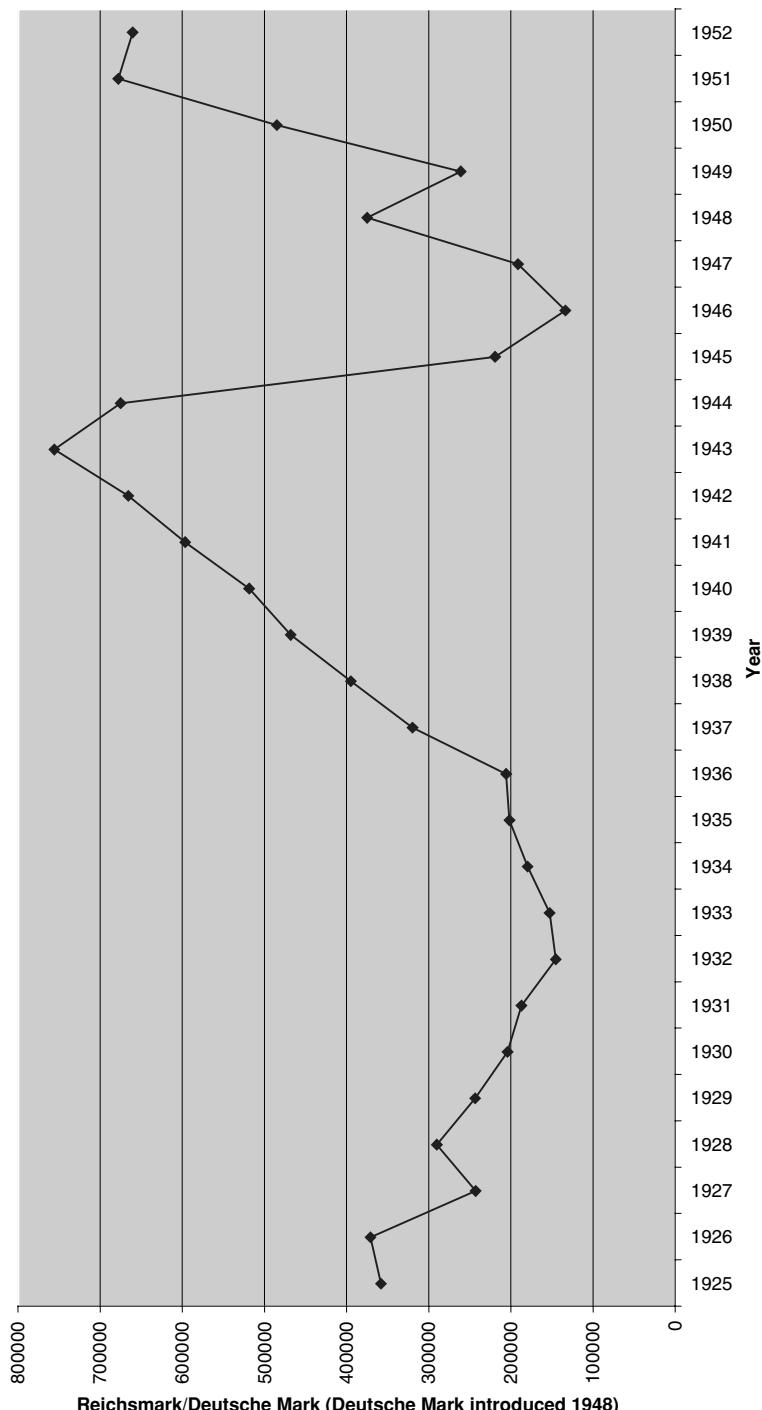


Figure III.9. BASF Turnover, 1925-1952 (thousands of Reichsmark/Deutsche Mark).
Source: Produced on the basis of figures presented in "Umsätze und Gewinne der BASF seit der Gründung 1865", BASF UA.

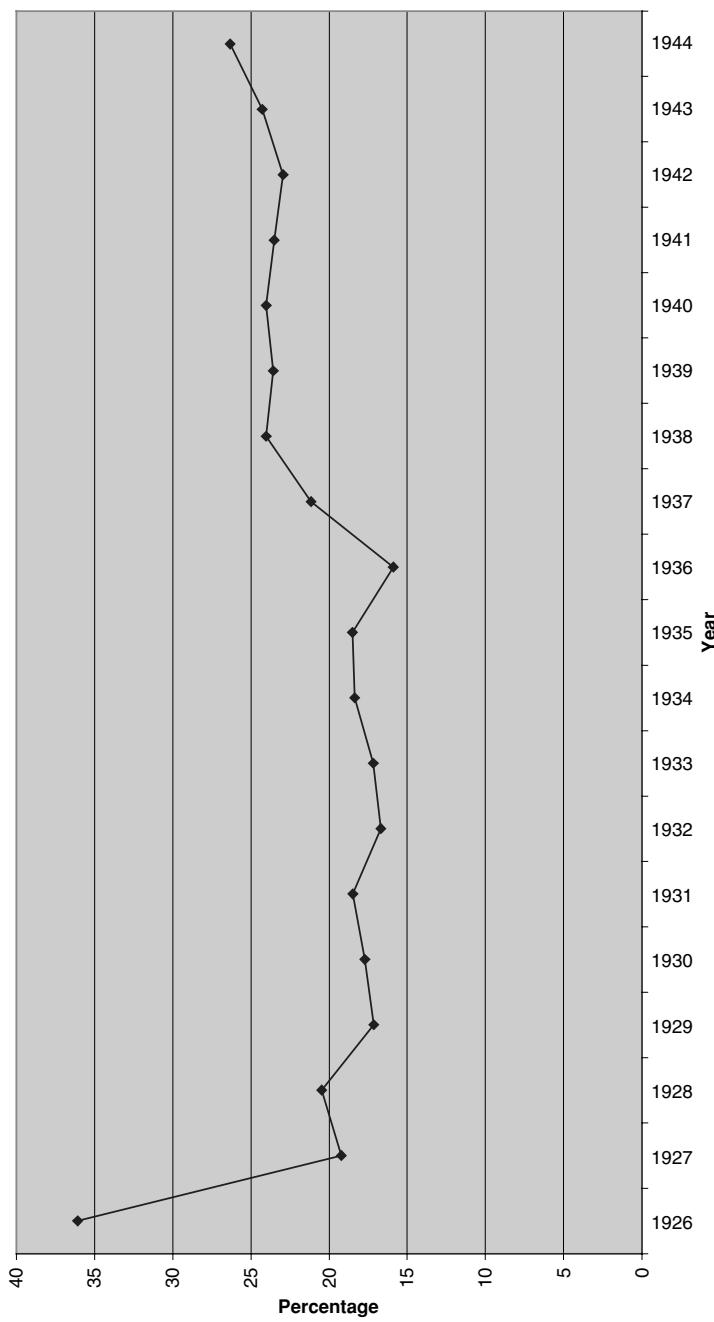


Figure III.10. BASF Turnover as a percentage of IG Turnover, 1926-1944.

Source: Calculated on the basis of figures presented in "Umsätze und Gewinne der BASF seit der Gründung 1865", BASF UA; and Hermann Gross, "Material zur Aufteilung der IG Farbenindustrie AG" (Kiel: Institut für Weltwirtschaft, 1930), table IIa.

earned on average less than 20 percent of the revenue for the IG as a whole. Between 1937 and 1944, however, their average “market share” within the IG was closer to 25 percent.

This brief statistical analysis allows a few preliminary hypotheses to be made. It appears that some of the historical weaknesses of the former BASF factories in the area of sales intensified following the IG fusion. This observation stems not only from the data that are available, but also from those that are not. Figures for overall revenues of the Upper Rhine factories were collected, whereas sales figures are often available only as estimates and not for all categories of goods. Profit figures for the factories are not available at all. The general hypothesis that fusion intensified aspects of pre-1925 BASF corporate culture within the Upper Rhine group seems confirmed by other trends also. The group’s pre-1925 emphasis on cutting-edge research and development (R&D) and on large-scale chemical production, for example, made it particularly susceptible to the impact of the Great Depression. On the other hand, continuing and even intensifying these traditional emphases within the Upper Rhine group made the former BASF factories more able than others to take advantage of the war economy.

Under the aegis of the IG, it appears that BASF’s corporate culture underwent some changes, especially through certain key characteristics becoming more pronounced. But what kind of impact did BASF corporate culture have on the IG? Given the size of the group’s contribution to overall revenue generation within the IG, it undoubtedly affected both the product mix of the concern and the IG’s relations with and dependency upon government for revenue growth and R&D funding. The Upper Rhine group’s size and previous traditions of excellence, combined with its traditions of strong leadership, meant that it had a major impact on the direction and development of the IG as a whole, not least through the figure of Carl Bosch, but also through the actions of Carl Krauch, Otto Ambros, and many others.

This brief overview of organizational and revenue development at the former BASF factories during the IG Farben period permits a brief statement of several hypotheses:

1. The fusion into the IG intensified certain aspects of BASF’s corporate culture, which may be summarized by the phrase “the primacy of technology.”
2. During the IG period, there was a tendency toward a splintering of the former BASF’s identity, organization, and authority. For instance, on the eve of the IG’s formation, the factories had effective control over their sales, finance, technology, production, and labor policies. Not long after the fusion took place, sales and finance were largely ceded to the IG, although the Upper Rhine group factories retained a large measure of influence over the other aspects of their activities. The National Socialist

(Nazi) period, however, involved a gradual, but clear, surrender of much of the control over production and labor to the state and its organizations. Technology was the one remaining area over which the group had a large measure of control.

3. Technology, in this context, remained the sole unifying force for the former BASF factories and the source of its power not only within the IG (involving a pronounced ability to shape the concern's corporate culture), but also vis-à-vis the German government and military.
4. Although National Socialist policies of autarky involved surrender of most controls over labor and production policy for the Upper Rhine group, they also provided a framework within which some reunification of its three former major centers, Ludwigshafen, Oppau, and Leuna, became possible. The three engaged in joint development of key production technologies, most prominently synthetic gasoline and rubber.
5. Attempts to realize this reunification led, however, to the IG's fateful involvement in Auschwitz, and the former BASF factories played a key role in this linkage.
6. During the postwar period, owing to Allied controls and the break-up of the IG, the former Upper Rhine group was forced to focus once again exclusively on its core factories in Oppau and Ludwigshafen and, through the need to establish sales and financial organizations, to restore some sort of balance within its corporate organization and structure.

These hypotheses are explored and developed in the sections that follow. The sections are organized chronologically, with divisions determined less by developments within the Upper Rhine group itself than by the larger economic and political events that constrained its ability (and that of its parent concern) to make independent decisions on commercial, technological, production, and labor policies. The sole exception to this rule is the starting point for all these developments, the establishment of what became the world's largest chemical company in late 1925 and early 1926.

2. FITTING INTO THE NEW CONCERN, 1925–1929

The establishment of IG Farbenindustrie AG and the initial years of its existence coincided with a period of relative economic and political stability for the still young, but already heavily battered Weimar Republic. Political stability, generalized confidence, and economic growth in the industrial world resulted in general economic recovery from the ravages of war and inflation. German industrial production grew an average of 7.9 percent per year between 1924 and 1929, while the economy grew at a somewhat more modest 4 percent per annum. German industrial exports performed well on world markets, and wages were on the rise.

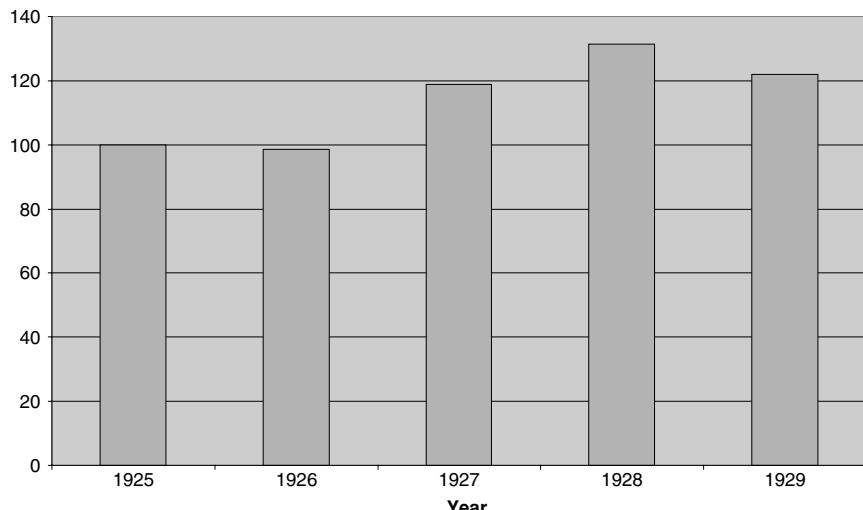


Figure III.11. Index of chemical production in Germany, 1925–29 (1925 = 100) (excluding Saar).

Source: OEEC, *Industrial Statistics 1900–1957* (Paris: OEEC, 1958) p. 16.

In retrospect, of course, it is possible to identify clearly the weaknesses lurking behind this apparently robust performance. Investment rates were low; and despite relatively good export performance, there was a persistent balance-of-trade deficit, mainly owing to reparations. In addition, wage rises were outstripping productivity increases, and although unemployment rates had fallen from about 10 percent in 1926 to just over 6 percent, this vestigial level was structural and, by 1929, on the rise again. Lastly, signs of a severe recession had already appeared in 1927, though they were hidden to some degree by foreign trade performance.³ But to many of those who lived through this period, it was a golden age, at least in comparison to what had happened previously, and, more importantly, to what followed.

The German chemical industry participated in this general upturn during the late 1920s to a considerable degree (see Figure III.11). Production of chemicals and allied goods, which had reached a postwar trough in 1923, nearly doubled in the following two years. From 1925 to 1928, production increased by a further 31 percent, before declining somewhat in 1929. The German chemical industry as a whole exported about 33 percent of its total production in 1925, amounting to about 10 percent of industrial exports in that year, and this figure remained relatively stable during the late 1920s. Furthermore, in relation to its foreign competitors, the German

³ Braun, *The German Economy*, pp. 46–54, 57–60.

chemical industry accounted for 23 percent of total chemical exports of major industrialized countries in 1925. The proportion rose to 28 percent by 1929.⁴ Productivity increases for the chemical industry as a whole amounted to 13 percent between 1926 and 1930, another impressive figure even though it lagged somewhat behind that of German industry as a whole.⁵

This substantial resurgence of the German chemical industry as a whole during the second half of the 1920s was in fact outperformed by the newly created IG Farben corporation. The concern increased its revenues steadily between 1926 and 1929, with the overall scale of the increase amounting to a healthy 38 percent. Significantly, this growth came on top of an already large base. The IG's export performance was even more impressive, and sales abroad accounted for well over half of the concern's revenues during a period of rapid growth between 1925 and 1929. The new chemical firm accounted for between 5.5 and 6 percent of *total* German industrial exports all by itself.⁶

Organizational Change and the IG

On December 2, 1925, the major chemical firms of Germany joined together formally into a single unit, IG Farbenindustrie Aktiengesellschaft, thus completing the formal process set in motion in October 1925, when the companies' representatives signed a legal agreement to carry out the fusion.⁷ The firms involved were: Actien-Gesellschaft für Anilin-Fabrikation (Agfa), Berlin; Badische Anilin- & Soda-Fabrik (BASF), Ludwigshafen; Chemische Fabrik Griesheim-Elektron, Frankfurt a.M.; Chemische Fabriken vorm. Weiler-ter Meer, Uerdingen; Farbenfabriken vorm. Friedr. Bayer & Co. (Bayer), Leverkusen; and Farbwerke vorm. Meister Lucius & Brüning, Höchst.

Into the new corporation the signatories brought with them significant holdings in a large number of other companies, including Leopold Casella, Frankfurt; Kalle und Co. AG, Biebrich; and the giant Leuna complex, the Ammoniakwerke Merseburg GmbH.⁸

⁴ Anny Reichl, "Chemische Industrie. Ihr Anteil am Umsatz und Export in Deutschland, den USA und Großbritannien," *Die BASF* 2 (May–June 1952), p. 89; Haber, *The Chemical Industry 1900–1930*, p. 330.

⁵ Braun, *The German Economy*, p. 51.

⁶ Kreikamp, "Die Entflechtung der IG Farbenindustrie AG," p. 226.

⁷ IG Farbenindustrie Aktiengesellschaft, "Agreement" [sic] (mit Anlagen) (Original), n.d. [beginning of October 1925], BASF IG, A 21/2. Note: The agreement indicates that "Mit dieser Vereinbarung gilt die Fusion ... de facto als durchgeführt." p. 9.

⁸ Ter Meer, *Die IG Farbenindustrie*, p. 26; "Bewertung der Beteiligungen in der Bilanz per 31. Dezember 1925 (Aufstellungen Nr 14 a–f)," n.d. [ca. 1926–7], BASF IG A 21/2. For unexplained reasons, an IG promotional brochure from 1933 and the testimony of Carl Bosch before a parliamentary committee in 1928, corrected and published in 1930, both

Despite the fact that the IG was a joint creation of more or less equal firms, some commentators have gone so far as to suggest that IG Farben *was* BASF. In a narrow technical sense, they are correct. After all, in order to carry out the fusion, the Ludwigshafen-based firm raised its capitalization to RM 646 million, the equivalent of its own capital plus that of all the other companies joining the new concern, and it assumed control of those companies' shares, changing its legal name to IG Farben in the process. When the new IG practically doubled its capitalization to RM 1.1 billion in 1926, eclipsing in the process the recently formed United Steel Works as Germany's largest corporation and joining the handful of the largest in the world, it was in no small part in order to finance projects begun at and pursued by the BASF-related factories. Carl Bosch, the long-standing head of the BASF group, took up the position of chairman of the managing board of the new trust, while retaining formal leadership of the Upper Rhine group.⁹ And the group, its traditions, and its technologies were essential elements of both the drive to create the giant trust and the IG Farben culture as it subsequently emerged. It is therefore entirely valid to support Peter Hayes's contention that BASF's "style and personnel exerted a fateful influence on the 20-year history of IG Farben." Yet it is surely going too far to say, as he does, that, "in a sense, BASF had swallowed the others."¹⁰

In fact, during the initial years of the new concern's existence, there was very little swallowing being done by any of the former component firms, including BASF. Moreover, to the limited extent that swallowing might have occurred, there was certainly no digesting taking place at all. Instead, the period from IG Farben's formation until the onset of the Great Depression was characterized by tentative (and largely unsuccessful) experiments with unified direction and control of the trust. It will be useful to examine developments at the concern level before we turn to the level of the BASF, or Upper Rhine group, factories.

One of the most important reasons for forming the IG was to attain what is now known in business circles as synergy. The whole was supposed to be greater than the sum of its parts. It was supposed to achieve economies of scale in mass production, that is, to expand the manufacturing facilities to the optimum size so as to allow for higher output at lower unit costs. This approach was, however, less important in the chemical industry of that

indicate that the IG owned just 75 percent (rather than 100 percent) of the Ammoniakwerke Merseburg GmbH. See *IG Farbenindustrie Aktiengesellschaft* (Frankfurt: IG Farben, 1933), p. 38; and "Ausführungen des Sachverständigen Dr. Bosch über die Produktions- und Absatzverhältnisse der IG Farbenindustrie Aktiengesellschaft Frankfurt a. Main," p. 119, (Eingereicht: 3. Dezember 1928; Nachgeprüft und ergänzt: 7. Mai 1930) in Ausschuss, *Enquête*, pp. 111–35.

⁹ Ernst Struss, Affidavit, "Die Betriebsgemeinschaften und die Entwicklung der IG Farben," August 30, 1947, p. 4, NI-9487.

¹⁰ Hayes, *Industry and Ideology*, p. 16.

day than for other industries, such as steel. Instead, those who formed the IG especially desired it to make more efficient and effective use of central services such as purchasing and sales in order to attain what business historian Alfred D. Chandler, Jr., has termed “economies of scope.”¹¹ Better communication and cooperation among the component divisions (generally the former firms that made up the concern) would allow the IG to innovate technologically and to compete more effectively on world and domestic markets.

That was the theory. In practice, however, the central institutions of the new trust in the initial stages indicated an organization that was not so much greater than, but rather in many ways exactly the same as, the sum of its parts. The membership of the supervisory board of the IG, for instance, was constituted with few exceptions simply by clubbing together the supervisory boards of the component firms. As can well be imagined, this arrangement did not make for an integrated organizational structure. And until the 55-seat membership was reduced substantially in size in the 1930s, the supervisory board of IG Farben remained a particularly unwieldy organization, with the result that the general and pronounced tendency of supervisory boards in Germany to simply rubber-stamp decisions of the managing board was intensified at the IG. Indeed, this problem was recognized implicitly even in the preliminary agreement to set up the IG of October 1925, for the main responsibilities of the supervisory board were to be taken up by a smaller committee, the Administrative Council (*Verwaltungsrat*), which was to be elected from the broader supervisory board membership.¹²

If anything, weighing in at an initial 83 full and deputy members, the managing board of the new corporation was even more bloated than the supervisory board. Composed for the most part of members and deputy members of the managing boards of the predecessor firms, the IG managing board also included heads of key committees and other emerging central institutions. Its size put a drag on flexibility, personal communication, and rapid decision making. Because these qualities were far more essential for the managing board, with its day-to-day operation of the trust, than for the supervisory board, Bosch never convened the full managing board.¹³ It met for the first time in a streamlined, downsized version only in 1937, two years after Bosch had retired from his position as chairman of the managing board. The companies that formed the IG also recognized the difficulties of working with such large numbers. In their preliminary agreement of October 1925, they had already expressed their wish to constitute a narrower, more collegial body that would, in conjunction with the Administrative Council,

¹¹ Chandler, Jr., *Scale and Scope*, p. 17.

¹² IG Farbenindustrie Aktiengesellschaft, “Agreement” [sic] (mit Anlagen) (Original), n.d. [beginning of October 1925], pp. 5–6, BASF IG, A 21/2.

¹³ Tammen, *IG Farben*, pp. 27–8; testimony of von Knieriem (p. 389) and Ilgner (pp. 390–2) in Trials of the War Criminals, vol. VII (Washington: U.S. Government Printing Office, 1953).

make most key decisions for the new trust. The Working Committee (*Arbeitsausschuss*) of the managing board consisted of a smaller, although still somewhat cumbersome, group of 25 to 30 key managing board members who were selected by Carl Bosch.¹⁴ But this number was still too large for the former BASF director, so in 1930–1 Bosch and a select group of seven other key managing board members, along with supervisory board chairman Carl Duisberg, began to guide the firm in the form of the Central Committee (*Zentralausschuss*, or ZA). As was to be expected, the Upper Rhine group was heavily represented within the ZA, not just in terms of numbers, but also influence. Bosch, of course, stood at the head of the committee, and Wilhelm Gaus, Karl Krauch, and Hermann Schmitz from the Ludwigshafen-Oppau conurbation all sat on it.¹⁵

Moreover, it was not just in this sphere of upper management that the new whole was merely the sum of its parts. To an astonishing degree, the initial organization of production – and, to a great extent, R&D – at IG Farben involved considerable separation and/or duplication of effort, with production and R&D generally organized along the customary lines of the component factory groups. Within IG Farben, there were initially four works groups: Lower Rhine, Central Rhine, Upper Rhine, and Central Germany. The reorganization of several works groups in November 1929 led to the addition of a fifth, Berlin. The first three groups were virtually identical to the major ones that had spearheaded the formation of the IG: Bayer, Hoechst, and BASF.

We will come back shortly to look in more detail at the Upper Rhine works group, the former BASF. For the moment, it is important to note a relatively small, but still very important, number of initiatives to create central organizations. By far the most significant was the establishment of a number of central sales organizations for the marketing of products of the IG as a whole.

The centralization of IG Farben sales activities was strongly endorsed by Carl Duisberg, the former head of the Bayer group and one of the most important figures promoting fusion. What is more, from the date of the establishment of the IG until his replacement in 1935 by Carl Bosch, Duisberg served as chairman of the supervisory board. Indeed, the earlier efforts of Duisberg and others made some headway in the direction of sales centralization even as early as 1918, when agreement was made among the member firms of the expanded IG (see Part two, section three) to distribute earnings according to a set formula.¹⁶ With the formation of the trust in 1925, and with the strong support of the BASF group, four “sales communities”

¹⁴ IG Farbenindustrie Aktiengesellschaft, “Agreement” [sic] (mit Anlagen) (Original), n.d. [beginning of October 1925], pp. 6–7, BASF IG, A 21/2.

¹⁵ *IG Farbenindustrie Aktiengesellschaft* (Frankfurt: IG Farben, 1933), p. 18; in BP ARC 38688.

¹⁶ Dr. H. Rötger, “Abschnitt IV. Verkauf der BASF-Produkte von 1925–1945,” 12.7.1966, pp. 2–3, BASF UA, T 01/1.

(*Verkaufsgemeinschaften*, or VG) responsible for sales from factories across the new trust were set up, each of which was in charge of a particular product line. They were the VG Dyestuffs; VG Chemicals; VG Pharmaceuticals; and VG Photographic supplies and artificial fibers. Sales of nitrogen fertilizers and technical nitrogen remained in the hands of the Berlin-based Stickstoff-Syndikat GmbH (Nitrogen Syndicate Ltd.), which had been founded in 1919. For the most part, oil products produced from coal, largely at the Leuna plant, were sold through Deutsche Gasolin AG, of which the IG owned 50 percent, with the remaining 50 percent owned equally by Shell and Esso.¹⁷

Although IG Farben and its predecessors had long since branched out into new, promising, and sometimes already lucrative areas of chemical production, sales of dyestuffs continued to be extremely important, especially for the firm's profits. The initial organization of dyestuff sales within the IG is therefore worth exploring in some detail. The VG Dyestuffs was subdivided into four groups depending upon the geographic focus of markets. It featured offices at Leverkusen, Hoechst, Ludwigshafen, and Casella. The Ludwigshafen-based section was responsible for sales of dyestuffs and dyestuffs intermediates to Switzerland, the Balkans, the Middle and Far East, and Africa (excluding Algeria).

The establishment of a VG Dyestuffs with four groups represented some degree of rationalization in that the groups halved the number of sales organizations for dyes that had previously existed in the component firms. But duplication of effort was still great. Already in 1928, Bosch therefore began pushing for further consolidation and rationalization. The desire to further centralize and rationalize sales of the IG's core products in the areas of dyestuffs, dyestuffs intermediates, and chemicals was one of the main motivations behind the decision to build a central administration building on the Grüneburg in Frankfurt Main in 1929. The building was completed in 1930, and the far-flung sales offices in the main factories of the works groups were finally concentrated in a single location.¹⁸

But even within this increasingly centralized organizational structure, the works groups, which represented in the main the IG predecessor firms, continued to exercise considerable influence. The VG Chemicals, for example, which was responsible for sales of inorganic and organic chemicals and intermediates, eventually had its main office in Frankfurt am Main, but it had branches at Agfa in Berlin, Hoechst, Leverkusen, Uerdingen, and Ludwigshafen. And Ludwigshafen itself was fitted out with its own sales section for tannins in 1927, which it retained for most of the IG period.¹⁹

There were thus a number of ambiguities attached to the attempts to reorganize and centralize sales during the initial IG Farben. On the one

¹⁷ Ter Meer, *IG Farbenindustrie*, pp. 45–6; “Erdöl-Verflechtungen,” n.d. (1931), BASF UA, Pier Akten 43; see also Karlsch and Stokes, *Faktor Öl*, especially pp. 138–40, 281–6.

¹⁸ Rötger, *Verkauf*, pp. 3–4; ter Meer, *IG Farbenindustrie*, p. 45. ¹⁹ Rötger, *Verkauf*, p. 5.

hand, central agencies were established. On the other, the locations of key regional offices guaranteed the continued influence and prominence of the major predecessor firms. Still, on balance, the forces of centralization in the area of sales seem to have been stronger than those tending to maintain the *status quo ante* fusion, and this tendency was to grow through time. The development had major consequences for the works communities in a variety of ways, including financing and cultural orientation.

These changes will be explored in more detail in the pages that follow. But a key point made by Fritz ter Meer is worth exploring further here: “The factories that made up the IG had practically no income at their immediate disposal since they did not sell their own products.”²⁰ Carl Wurster, who later became the head of the Upper Rhine group and, after 1952, chairman of the BASF managing board, made the same point even more poignantly in 1948 at Nuremberg. Asked how bookkeeping had functioned during the IG period with regard to Ludwigshafen, Wurster replied:

I have only become a financial man and a commercial man [after] 1945–1947, but before that date I would never concern myself with these bookkeeping details. There were gentlemen... whose job it was to deal with these things. I only know about these things since... the war but not before.²¹

For the major German chemical firms that joined to form the IG, the centralization of sales meant a decoupling – admittedly never complete, but still striking – of activities centering on production and research on the one hand from the companies’ traditional parallel and largely equal orientation toward sales and their customers on the other hand. This decoupling was particularly pronounced with regard to the BASF group, not least because the establishment of central sales communities within the IG led to a splintering of the group’s output: Its high-pressure synthesis products were sold through a variety of central sales organizations depending upon final application.²²

The IG’s considerable movement toward centralization of function within the first few years after fusion (although it was only in 1930 that the main sales organizations were brought together into a single building) was shepherded by one of two key committees, which together served as important engines of integration and organizational change in the initial years of the trust. The Commercial Committee (*Kaufmännischer Ausschuss*, or KA) included key members of the managing board and other relevant personnel associated with sales. This committee declined in importance over time, possibly as a result of the very success achieved in integrating sales functions within the concern. Far more important, especially during Bosch’s tenure as

²⁰ ter Meer, *IG Farbenindustrie*, p. 48.

²¹ United States Nuremberg War Crimes Trials: United States of America v. Carl Krauch et al. (Case VI), Transcripts, p. 11107, April 12, 1948, seen in IWM, London.

²² Rötger, *Verkauf*, p. 5.

chairman of the concern's managing board, was the IG's Technical Committee (*Technischer Ausschuss*, or TEA), composed of technologically oriented managing board members as well as other relevant key personnel from production plants. It was serviced by a powerful bureaucratic and technical organization, the TEA Office. In addition to these two bodies, a number of other committees and organizations responsible for central servicing of the needs of the works groups with regard to purchasing, advertising, bookkeeping, legal affairs, and other matters were also formed in the initial years of the great trust.

This brief outline cannot hope to describe every detail of the organizational changes that accompanied the formation of IG Farben. Even so, it should be clear that attempts at forming central organizations were tentative and did not yet represent a coherent strategy for integrating the former components into a new firm. Instead, those former components remained remarkably intact, and the decision making with regard to production, R&D, and many other functions remained in the hands of the works groups. Already in August 1929, however, Bosch commissioned more radical planning to give the IG a divisional structure that would cut across the works groups, focusing on coordinated investment and technical and production planning.²³ The founding of the *Sparten* is examined in more detail later in this section and the next.

Regardless of the limits to centralization in these early years after the foundation of IG Farbenindustrie AG, however, its formation entailed the emergence of a new, very powerful, and highly regarded force in German and international industry. At the center of the new trust were the factories of the former BASF, in the newly formed Upper Rhine group.

The Upper Rhine Group in the Initial IG Period: Organization and Relationships with Other IG Plants

The formation of IG Farbenindustrie AG ushered in an unprecedented era for the factories formerly belonging to BASF. Managers and engineers of the group were able to focus their attention and activities to a degree never previously encountered. Because of the growing centralization of sales and financing, that focus was to be almost exclusively on production and R&D, with particular concentration on the products of high-pressure chemical technology.

In the first years of the IG, the group resumed full control of the gigantic Leuna complex in Merseburg in central Germany, which had been established by BASF and expanded with governmental financial support during World War I. Leuna, however, was becoming so important that it was

²³ Ernst Struss, Affidavit, "Die Betriebsgemeinschaften und die Entwicklung der IG Farben," August 30, 1947, p. 12, NI-9487.

granted greater and greater degrees of independence from the core BASF plants on the Rhine. By the late 1920s it was operating substantially in its own right.

None of these changes occurred immediately, however. As already indicated, central institutions for sales and other matters emerged only gradually within IG Farben. In the meantime, much proceeded as it had before within the Upper Rhine group. The group director was Carl Bosch himself, who, through his force of personality, also retained Leuna firmly within the group's orbit for a time. Curt Meyer served as factory manager at Ludwigshafen, Wilhelm Gaus at Oppau, and Erich Dehnel at Leuna. The overall factory directors, key managers of production areas, and the heads of the sales organizations located within the group's factories continued to meet on a regular basis, constituting what was basically a continuation of BASF's former managing board. There was thus considerable coordination of activity among the directors, although the geographic proximity between Ludwigshafen and Oppau permitted much more frequent face-to-face contact among staff and leadership of the two core factories of the group. But it was only with Leuna's growing independence in the late 1920s, the diversion of Bosch's attention to the affairs of the concern as a whole, and the relocation of the commercial directors from Ludwigshafen to IG Farben's new administration building in Frankfurt in 1930 that the Upper Rhine group's "managing board" ceased meeting. It was replaced by periodic "meetings of the Directorship" of the Upper Rhine group. At the first one (December 1930), Gaus acted as chairman of the directorship (and, from 1933, as leader of the group as a whole until his retirement in 1937), having been entrusted by "Herr Geheimrat Bosch... to represent him in the works group."²⁴

During the early 1930s, in particular through the establishment of the *Sparten*, or product divisions, some of the connections between the Upper Rhine group and other IG Farben factories strengthened. But during the initial IG period, a strong sense of splendid isolation prevailed in the former BASF group, as was especially clear in early postfusion editions of the factory newspaper for the lead plant at Ludwigshafen. During 1926, IG Farben and its factories outside the Upper Rhine group were rarely mentioned, and even then only in passing. In February 1927, however, the editors undertook a major effort to acquaint their readers with plants outside their immediate group, starting with the Agfa plant in Berlin-Treptow. Their intention was to begin the process of forging a new identity within IG Farben through

²⁴ Ernst Struss, Affidavit, "Die Betriebsgemeinschaften und die Entwicklung der IG Farben," August 30, 1947, p. 12, NI-9487; Ernst Struss, Affidavit, August 5, 1947, p. 2, C10/2, BASF IG; "Niederschrift über die 1. Direktionsbesprechung in Ludwigshafen am 17. Dezember 1930," p. 1, C13 Direktionssitzungen Ludwigshafen, 1930–1939, BASF UA. In his opening remarks, Gaus refers explicitly to the "nach dem Wegzug der kaufmännischen Direktoren zusammengeschrumpften Vorstandes" of the Upper Rhine Group.

awareness of the trust: “In order to familiarize our readers also with the large family of our IG Farbenindustrie Aktiengesellschaft firms, we intend to publish a colorful series of articles on them.” Additional articles followed on Bitterfeld, Wolfen, Leverkusen, and others, with most of the focus on the IG plants in central Germany.²⁵

Central Germany was also the location of the Leuna complex, which was organizationally located within the Upper Rhine group at the beginning of the IG period but which was physically quite far afield. However, the factory’s initial inclusion within the Upper Rhine group was for good reason. Aside from historical traditions, there were compelling technological arguments for Ludwigshafen and Oppau to continue directing the Leuna works. Leuna and Oppau were the most important sites in Germany (and indeed in the world) for the development of high-pressure chemistry, which was proceeding apace during the late 1920s. In fact, one central reason for the formation of IG Farben was the need to raise capital for investment in vast new projects, particularly those involving synthetic fuels. Much of this funding flowed into these two plants, as will be explored in more detail shortly.

Moreover, it was Ludwigshafen that took the lead in the design of a new plant for high-pressure synthesis, whether within the Upper Rhine group or, later, outside it. Ludwigshafen-Oppau also oversaw construction of most new plants, whether within their factories or in Leuna. Leuna, on the other hand, carried out much of the construction work for its own facilities. But all of these activities presupposed close relations, frequent collaboration, and constant communication with production engineers and leading managers in factories within the Upper Rhine group. Over time, as we shall see, the same skills in coordination and communication were necessary for a growing number of construction projects outside the group.²⁶

The two primary foci of the newly formed works group, however, were production and R&D. Both were firmly rooted in the traditional locations of Upper Rhine group’s factories at Ludwigshafen, Oppau, and Leuna.

Trends in Production

A mixture of continuity and change in the production program of the newly formed Upper Rhine group marked the initial IG Farben period. The two core plants of the group on the Rhine continued their previous general division of labor. The Ludwigshafen factory continued as the lead factory, producing a wide range of organic chemicals, with particular emphasis on dyes and dye intermediates, chlorine-based chemicals, and eventually plastics and synthetic rubber. Oppau meanwhile remained a more junior member,

²⁵ *Werkszeitung Ludwigshafen*, vols. XIV–XVII; quotation from *Werkszeitung XV*, no. 2 (February, 1927), p. 26. BASF UA.

²⁶ Mach, *Entwerfen und Bauen*, pp. 103–4.

specializing in heavy chemicals and high-pressure processes, in particular ammonia, methanol, and higher alcohols and their derivatives. Both, however, featured a number of large laboratories that continued the group's traditions in R&D and that will be the focus of the next section. Together, the two core plants of the group featured a remarkable scale and range of production capacity, amounting to more than 2,000 separate products by the end of World War II.²⁷

Initially, the Ammoniakwerke Merseburg GmbH, the Leuna works, continued as the most junior member even though by 1925 it had already outstripped Oppau in size. Leuna, moreover, had enormous potential for growth owing to its location on a massive greenfield site in close proximity to coal and water resources. But it was much more focused than its parent plants on relatively few product lines, only about 80 in all by the end of World War II.²⁸

From 1925 to 1929, the Upper Rhine group enjoyed high levels of investment unparalleled until the late 1930s and early 1940s. As will soon become clear, the group's factories engaged in the newest – and most expensive – types of chemical production, and funding was commensurate with these operations. The Leuna works were by far the largest recipient of funds within the IG as a whole, with RM 256 million flowing into the factory between 1925 and 1929. This amount was more than three times that received by the factory enjoying the next highest rate of investment by the concern during this period, Leuna's parent factory at Ludwigshafen. Ludwigshafen, with RM 71 million in investment, received nearly a quarter more than the lead factories of the other two major works groups, Hoechst and Leverkusen, which were ranked third and fourth in terms of investment from 1925 to 1929. But these two were followed closely by the IG's mines, which eventually came under the control of personnel from Oppau and Leuna with the formation of *Sparte I*, and by the Oppau factory, which received RM 53 and RM 48 million in investment, respectively. To put this picture in perspective: Only a handful of other IG factories enjoyed investment of more than RM 15 million during this initial period of the trust's existence.²⁹

One key reason for the lavish investment enjoyed by the Upper Rhine group factories was their involvement in one of the most exciting areas of development for the chemical industry beginning in the second decade of the twentieth century, high-pressure chemistry. Synthetic ammonia production had been essential to Germany's survival during World War I, having served

²⁷ USSBS Oil Division, "Ludwigshafen-Oppau Works of IG Farbenindustrie AG, Ludwigshafen, Germany," 2nd edition (January 1947), p. 4.

²⁸ USSBS Oil Division, "Ludwigshafen-Oppau Works of IG Farbenindustrie AG, Ludwigshafen, Germany," 2nd edition (January 1947), p. 4.

²⁹ Figures derived from bar chart in "Investment in large plant of IG in millions of RM," August 18, 1945, FO 1031/233, PRO, Kew.

as a basis for production of nitrogen-based fertilizers and ammunition. After the war, ammonia remained an important product within IG Farben in terms of both sales and profits, and in the Oppau and Leuna plants, which continued to manufacture the lion's share. The IG's total sales of synthetic nitrogen amounted to RM 440 million in 1926, rising to RM 504 million in 1927, and to RM 540 million in the year of peak revenue in 1928. In 1929, however, sales dipped somewhat, to RM 502 million, although this figure was to topple far more substantially as prices collapsed in the wake of the Great Depression. Even before 1929, though, pressure on prices was in evidence. During the same period, 1926–9, nitrogen sales as a percentage of total IG Farben sales shrank steadily from over 42 percent to 35 percent.³⁰

Despite this relative decline in sales of nitrogen, both plants remained gigantic, with ammonia production integrated with other high-pressure and heavy chemical processes. In 1927–8, around 35,000 people worked at Oppau and Leuna, accounting for about a third of all IG Farben employees. By 1933, the two employed 86 percent of all IG workers involved in *Sparte I* (ammonia, synthetic oil, and mines).³¹

Given the unrivaled experience gathered by members of the Upper Rhine group during the development of commercial synthetic ammonia production, and given the expensive talent involved in the development work, it was only natural that the group would turn to related technologies during the 1920s. The first major project involved the synthesis of methanol. Attempts in this direction had been made at BASF by Alwin Mittasch and Christian Schneider already before 1914. Until that time, methanol was available only from wood distillation. Synthetic methanol, on the other hand, was relatively expensive and hard to come by, but it was also very desirable. It could serve as a raw material for a host of valuable chemical intermediates, particularly formaldehyde-based ones, which could be sold to other producers but which was also used (sometimes in conjunction with other materials) to manufacture a host of other items eventually including industrial adhesives, fire-retardant materials, dyes, plastics, and synthetic rubber.

Mittasch and Schneider's efforts had to be broken off owing to the war, but resumed at Ludwigshafen in 1922 under the direction of Dr. Matthias Pier. Occupation of the Ludwigshafen factory in May 1923 by the French, however, forced Pier and some of the researchers and technicians on his team to flee eastwards together with their most important equipment to the Leuna works, where further efforts resulted in successful production of synthetic methanol in a pilot plant on September 26, 1923. Three full-scale production

³⁰ Marsch, "Strategies for Success," p. 68.

³¹ Figures for 1927–8 in Haber, *The Chemical Industry 1900–1930*, p. 285; 1933 numbers calculated on basis of figures presented in IG Farbenindustrie Aktiengesellschaft, Ludwigshafen a. Rhein, "Belegschaft der Sparte I" (Chart, n.d., ca. spring 1941), BASF IG, A251/3.

plants whose construction subsequently began at the Leuna works came online at the end of 1923.³²

Pier's success in scaling up methanol synthesis to industrial size made him the prime candidate for directing the development of the BASF's next major project, the massive effort to synthesize petroleum from coal. Pier therefore returned to Ludwigshafen, where, beginning in 1924, his team rapidly developed this technology on the basis of work that had been done by a number of others, including Friedrich Bergius.

Synthetic fuel technology represented a natural progression for BASF commercially and technologically.³³ Commercially, it had both clear precedents for, and great promise of, success. The first two large-scale syntheses (of ammonia and of methanol) had required substantial development funds, but by the mid-1920s they were paying handsome dividends. This profitability could be expected to continue for some time, but it was already clear that a successor product or products would have to be found to take their place in the medium to long term. When BASF made the decision to commit heavily to synthetic fuels, it appeared that petroleum production would fit the bill perfectly. Growing motorization, especially in the United States, led to sharp increases in demand for petroleum products, in particular gasoline. Yet as late as 1926, experts of the U.S. Federal Oil Conservation Board estimated that reserves of natural petroleum would last for just seven more years. Should BASF (by now the Upper Rhine group within IG Farben) succeed in developing a synthetic alternative quickly, it was believed, the commercial payoff would be enormous.

Besides making sense in terms of business and commercial strategy, synthetic fuels also constituted a logical *technological* progression from earlier large-scale synthesis technologies. All three of these technologies involved the use of hydrogen. All three syntheses operated under extreme conditions of high pressure and high temperature. And all three required sophisticated capability in and knowledge of catalyst technologies.

Yet, despite being the world's most sophisticated and advanced practitioner in all of these areas, the Upper Rhine group found that it faced enormous barriers in taking a process proven on a minute scale in a laboratory and translating it into a large-scale industrial one. Progress was thus slower than it had been in the case of the earlier syntheses. Nevertheless, by 1926 the process had been developed to a point where it was clear that it could be pursued on an industrial scale in a 100,000-ton-per-year plant. The Leuna works, with massive brown-coal holdings nearby, plenty of space for

³² Mach, *Entwerfen und Bauen*, p. 84; von Nagel, *Methanol, Treibstoffe*, pp. 7–36.

³³ The following discussion is based on a variety of sources. See, for instance, von Nagel, *Methanol, Treibstoffe*, pp. 37–47; Mach, *Entwerfen und Bauen*, pp. 85–9; Stranges, “Germany's Synthetic Fuel Industry, 1930–1945”; Stranges, “Friedrich Bergius”; Stokes, “The Oil Industry in Nazi Germany,” Birkensfeld, *Der synthetische Treibstoff*.

expansion, and capacity for hydrogen generation, were chosen as the main production site. The first commercial products of coal-to-oil synthesis, including “Leuna gasoline,” came onto the market on April 1, 1927.³⁴

Even though teething problems plagued Leuna’s synthetic fuel production facilities, forcing them to deploy brown-coal tar rather than brown coal as a feedstock until the difficulties were overcome in 1931, output increased dramatically between 1927 and 1929. From just over 1 ton of final product in 1927 (virtually all of which was gasoline until the second half of the 1930s), the Leuna works produced 27,000 tons in 1928 and nearly 68,000 tons in 1929. Revenue also increased proportionately, from a negligible amount in 1927 to RM 6 million in 1928 and 14 million in 1929.³⁵

This decision by BASF to embrace and then, within the context of the IG, to expand synthetic fuels technology was a fateful one for several reasons. For one thing, it was a major factor in Carl Bosch’s enthusiasm in 1924–5 for fusion of the largest German chemical firms into a single concern. Only in the context of an enlarged, unified company would such a massive project of development, investment, and production be financially prudent. What is more, the prognoses of the mid-1920s about future supplies of oil were quickly proven wrong through discoveries in the late 1920s of enormous reserves in the southern United States and elsewhere. In other words, the decision to develop synthetic fuels committed the IG to a technology whose commercial viability seemed far less certain than it had been before Leuna was expanded for this very purpose. This was not at all a welcome development from the perspective of IG Farben, not least because net losses for the process already amounted to RM 85.2 million. And this massive loss came despite a huge license payment by Standard Oil of New Jersey in late 1929.³⁶ Trimming the cost of production thus became high priority.

There were, moreover, additional, longer-term implications to the decision to embark on this new technology. With the onset of the Great Depression in 1929 and its intensification in the 1930s, the costs of natural petroleum fell still further, whereas those of hydrogenation remained high. Losses from coal-to-oil technology escalated, with the result that IG Farben officials, led by Bosch and a number of top Upper Rhine group managers and engineers, felt compelled to seek state support for the production area. Though not

³⁴ Ludwigshafen, Hochdruckversuche, “Kurzes Referat des Vortrages von Dr. M. Pier auf der TEA-Sitzung in Frankfurt a.M. am 28. Oktober 1942: ‘Entwicklung der Methanol-Synthese und der katalytischen Hochdruckhydrierung anschließend an die Ammoniaksynthese bis zum heutigen Stand’,” November 9, 1942, p. 1, Pier Akten 44, BASF UA.

³⁵ Ludwigshafen, Hochdruckversuche, “Kurzes Referat,” November 9, 1942, p. 1, Pier Akten 44, BASF UA; “Produktion und Gestehskosten Leuna,” June 27, 1947, Pier Akten 49, BASF UA; Fachverband Kohlechemie, Wichtige Zahlen, Teil I: Inland, vol. 23 (1971), p. 42; Marsch, “Strategies for Success,” p. 69; Stranges, “Germany’s Synthetic Fuel Industry,” Table 1.

³⁶ “Kosten der Hydrierung,” June 30, 1947, Pier Akten 49, BASF UA.

unheard of for the firm (e.g., note the application and expansion of Haber-Bosch ammonia technology at the Leuna works during World War I using state funds), this new action set the stage for further entanglements with the German state during the National Socialist period.

In the short term, the decision to embrace synthetic fuels technology, and the relatively rapid success of that development, involved the IG (virtually exclusively in the person of officials from the Upper Rhine group) to an unprecedented degree in the heady world of top-level international business diplomacy. In particular, through hydrogenation technology, the new German giant began long and close cooperation with one of the most powerful corporations in the world, Standard Oil of New Jersey.³⁷

During the 1920s and 1930s, the boundaries between the chemical and the oil industries, which had previously seemed so clear, were fluid and evolving. The IG and Esso, like other firms in these industries, were anxious to fix these boundaries in their own interest. The IG, however, was particularly anxious about the prospect of an oil juggernaut entering the chemical industry, since the oil multis were extremely powerful, especially if two or more of them acted in concert.³⁸ This concern about the possible expansionist strategies of big oil firms was complemented by a realization that the BASF group's foray into the oil industry might incur the wrath of one or all of the mighty "seven sisters" who controlled international petroleum production and sales. Bosch therefore determined that this tack was only possible in partnership, rather than in competition, with one or more of the seven. To this end, Gaus visited Standard Oil in 1925 to discuss Standard's potential interest in an antiknock compound already developed by BASF and in the processes under development at Ludwigshafen for hydrogenation of coal.

As might have been expected, Jersey Standard was indeed interested in the hydrogenation process, and that interest had both an immediate and a long-term dimension. In the short term, Esso saw massive potential for hydrogenation for processing less valuable heavy oils and tars into liquid fuel products that were both in higher demand and more profitable. As was the case in the chemical industry, the scale of profits in the oil industry depended upon efficient upgrading of "waste" into high-value added products. The longer-term interest of Esso was in the potential of hydrogenation for allowing use of alternative hydrocarbon materials, such as coal, to produce motor fuels. If the world ever *did* run short of natural petroleum, or should IG Farben be able to trim production costs through continuous development and incremental improvements so much that synthetic fuels became competitive with natural petroleum, Standard wanted to be in on the ground

³⁷ Hayes, *Industry and Ideology*, especially pp. 37–8; Tammen, *Die IG Farbenindustrie*, pp. 55–8, 100–3; Yergin, *The Prize*, pp. 330–1.

³⁸ Duden, "Betr. Einige Ueberlegungen angelegentlich der Uebertragung des Four Party Agreements auf die Shell," January 20, 1933, BASF UA T 75/1.

floor. However, it was the short-term, not the long-term, consideration that made Esso so keen on the new technology. It provided the main reason for the visit of the head of Standard Development Corporation, Frank Howard, to Ludwigshafen in March 1926 to view the progress of Pier's development work.³⁹ Bosch himself went to the United States later the same year, accepting an invitation of W.C. Teagle, Standard of New Jersey's chairman of the board, "to accompany him on the autumn inspection trip through the Esso empire."⁴⁰

Both sides therefore saw considerable advantage in close cooperation in this area. Standard accepted the idea for the reasons just stated; the IG, not only because cooperation would avoid the necessity of open conflict with the most powerful oil company in Germany but also because Standard could provide experience in oil refining and a system of distribution. There was also a potential for handsome payoffs through sale of licenses for the process, which would, in turn, provide funds for additional development and investment. In summer 1927, therefore, a first agreement between the two was struck, through which Esso was to finance and build a large experimental hydrogenation plant in conjunction with an oil refinery in Baton Rouge, Louisiana, under the IG's technical direction. The intention was to apply the IG process at two other Esso installations, although only the project at Bayway, New Jersey, had been carried out by 1930. Prospective licensees of the process were to be allowed to inspect the experimental facility, and any royalties received would be shared 50:50 by Esso and the IG. No monetary payments from either party took place at this time, but there were short-term exchanges of personnel. The agreement entailed considerable contact between engineers and managers of the two massive corporations, involving frequent trips across the Atlantic from both sides.⁴¹

Cooperation was thus satisfactory from the outset. Still, each company was keen to protect its interests more fully. In particular, IG Farben wished to defend itself from Esso's steadily improving patent position in the hydrogenation field, especially because coal-based hydrogenation was not covered by the earlier agreement. Esso, for its part, wished to gain control over the IG patents themselves, both as they applied to coal and to oil. Thus, the agreement was renegotiated and expanded extensively in November 1929, and it is noteworthy that high-level IG employees, all intimately associated with the Upper Rhine group, went to the United States to negotiate its details. They included Bosch himself; Hermann Schmitz (who later became the chairman of the IG managing board); Adolf von Knieriem, a patent lawyer attached

³⁹ Howard, *Buna Rubber*, pp. 10–38, especially p. 13.

⁴⁰ Haber, *The Chemical Industry, 1900–1930*, p. 296.

⁴¹ Control Office, IG Farbenindustrie AG, U.S. Zone, "Activities of IG Farben in the Oil Industry," January 14, 1946, pp. 152–3; von Nagel, *Methanol, Treibstoffe*, p. 50.

to Ludwigshafen; and Gaus, a technical expert who was head of Oppau and by 1930 Bosch's stand-in as the director of the Upper Rhine group.

The agreement balanced the interests of the two enterprises very well. In exchange for 2 percent of Standard Oil of New Jersey's stock, or 546,000 shares, valued at \$35 million, IG Farben surrendered the rights to its hydrogenation technology outside Germany. The two industrial giants also agreed to stay out of each other's area of expertise and experience (the "division of fields agreement"), and to set up a joint firm, Standard-IG, to exploit the patents and know-how arising from the R&D work in their field of mutual interest. A related agreement on sales signed at the same time guaranteed that the IG would sell all its liquid fuel products in Germany through Esso's subsidiary, DAPG, and that, furthermore, DAPG would market them in preference to its own production. Esso also offered the IG a 20 percent share in royalties received from any licenses in the hydrogenation field, apparently to ensure the IG's continued R&D in applications of hydrogenation to crude oil refining in particular.⁴²

The agreement was extremely important for two main reasons. First, it went a considerable way toward stabilizing the finances of the IG in the high-pressure field dominated by the Upper Rhine group. This improvement would soon become even more pressing with the onset of the Great Depression. In fact, payments from Esso – mainly through the stock transfer – amounted to between RM 200 million and 250 million from 1925 to 1929. Yet despite this massive infusion of cash, losses in the sector of synthetic fuels amounted to over RM 85 million during the same time. Eventually, during the late 1930s and early 1940s, hydrogenation would secure some profits for the firm, but only because of the Esso payments.⁴³ Second, the agreement between IG Farben and Esso caused a flurry of anxiety within the oil and chemical industries, prompting interest from Royal Dutch Shell and from Imperial Chemical Industries (ICI), both of which had already spent substantial sums of their own on developing hydrogenation technology. On April 10, 1931, the four industrial behemoths signed a set of four interlocking agreements to expand the scope of the International Hydrogenation Patents company already set up by Standard-IG to coordinate and exploit their intellectual property in this key field.⁴⁴ All in all, then, the synthetic fuel technology developed primarily by the Upper Rhine group guaranteed the IG's place with other major players at the international business table, resulted in clear financial payoffs, and appeared to offer potential for growth and prosperity in the future.

⁴² "Activities of IG Farben in the Oil Industry," pp. 153–4; Hayes, *Industry and Ideology*, p. 38; Yergin, *The Prize*, p. 331.

⁴³ "Kosten der Hydrierung," June 30, 1947, BASF UA, Pier Akten 49.

⁴⁴ Reader, *Imperial Chemical Industries*, pp. 162–82, especially p. 170.

Besides these high-prestige, high-pressure areas of production for which it was best known, the group also continued to play a major role in the German chemical industry's original area of strength and prominence – the production and sales of dyestuffs and dyestuff intermediates. In the initial years after the trust's founding, dye and dye intermediate sales accounted for about 33 percent of the corporation's revenue, with the Upper Rhine group producing between 45 and 50 percent of that amount.⁴⁵ Dyes were also responsible for a substantial proportion of the corporation's profits.⁴⁶

Production of general chemicals was also well represented by the group within the IG, although in some areas it was more prominent than others. The proportion of the IG's revenue in chemicals generated by the group rose from just over 10 to about 13 percent between 1928 and 1930. Organic tannins represented a particularly high share of this revenue category, with the Upper Rhine group factories responsible for over 96 percent of production and sales. In these years, the group also accounted for nearly 25 percent of the trust's acids, over 25 percent of its sales volume in solvents, and more than 14 percent of the IG's total sales of organic intermediates during the same period.⁴⁷

In addition to all of these production areas, one other major source of the IG's income from the group must be mentioned. For the first time since the late nineteenth and early twentieth centuries, the former BASF began in the initial IG period to design and build factories abroad. During 1928, Upper Rhine group engineers were responsible for the design and construction of a factory in Toulouse, France, owned by the Onia Corporation. The plant had a yearly capacity of 50,000 tons of pure nitrogen, which was synthesized via gasification of coke. In the same year, moreover, the engineers constructed a facility to manufacture 98,000 tons of pure nitrogen per year in Norway for Norsk Hydro. But the renewed activity in plant design and construction for other firms did not last very long. Owing to the Depression, the only projects in which the Upper Rhine group was involved between 1928 and 1934 were those in Baton Rouge, Louisiana, and Bayway, New Jersey.⁴⁸

Research and Development

Despite the fact that one main motivation for forming IG Farben was to take advantage of scales of scope in areas such as sales and research, much of the R&D work of the new combine was controlled by and carried out within

⁴⁵ Rötger, "Verkauf der BASF-Produkte von 1925–1945," February 24, 1967, Table 13, BASF UA T 01/1.

⁴⁶ Tammen, *Die IG Farbenindustrie*, pp. 89–90, 143–4; Hayes, *Industry and Ideology*, p. 43.

⁴⁷ Rötger, "Verkauf," May 27, 1966, Table 3a.

⁴⁸ "Von der BASF in Deutschland und im Ausland gebaute Anlagen," n.d. [ca. 1962], pp. 1–9, BASF IG R 01/1.

the works groups. With its responsibilities for developing the new and very expensive areas of high-pressure chemistry, the Upper Rhine group was at the forefront here, both in terms of numbers of researchers and technicians and in terms of the funding lavished on them and their work. In addition, the group continued work in more traditional areas such as dyestuffs.

The basic structure and organization of research within the group thus remained largely as it was before, and each of the main factories had its own large laboratory. The most important of the laboratories, with the broadest scope and responsibility (although not the largest staff, for that honor belonged to the Ammonia Laboratory), was the Main Laboratory, located at Ludwigshafen. The number of academics employed there fluctuated from 53 at the end of 1925 to 44 in mid-1928 and 47 by early 1930. Support staff in the form of waged and salaried employees grew during the same period, so that the total number stood at 246 at the end of 1925, 344 in mid-1928, and 351 at the beginning of 1930. As one would expect, the expansion of personnel was accompanied by an expansion in the space available for them to do their research work. In 1927, one of the two buildings dedicated to the Main Laboratory at Ludwigshafen underwent considerable enlargement.⁴⁹

Ludwigshafen was not the only factory within the group to have a significant research establishment. Oppau was the site of one of the group's other key research facility, the Ammonia Laboratory. It, together with the group's Agricultural Experimental Station at Limburghof, carried out research into agricultural applications of nitrogenous fertilizers. The personnel of the Ammonia Laboratory also looked into issues associated with synthesis gases, high-pressure chemistry, and catalysts, all areas of evident interest in the group's hydrogenation R&D program. Its head in the initial IG period until his retirement in 1933 was Alwin Mittasch. Mittasch had worked closely with Carl Bosch in developing large-scale synthetic nitrogen production from the first decade of the twentieth century and was the lab's director as of the early 1920s. He placed particular emphasis on catalytic process development and mixed catalysts, which had applications in a whole host of the production processes that the Upper Rhine group utilized.⁵⁰

Leuna, the largest production site of the group, was at the same time the least important in terms of R&D capability. But its Experimental Laboratory carried out important development work, in particular with regard to the high-pressure processes deployed at Leuna. The Leuna lab, unlike the others in the group, could carry out R&D work and testing based on "continuously

⁴⁹ Curt Schuster, "Die Geschichte des Hauptlaboratoriums 1938–1957," typescript, p. 230, BASF UA; H. Hopff, "Die Bedeutung der wissenschaftlichen Laboratorien für die chemische Industrie," *Werkszeitung* 18, no. 5 (May 1930), pp. 65–6; Schuster, *Badische Anilin- & Soda-Fabrik AG*, p. 29.

⁵⁰ Schuster, *Badische Anilin- & Soda-Fabrik AG*, pp. 20, 22, "Activities of IG Farben in the Oil Industry," pp. 168–9.

running semicommercial units, [which] are only available at an operating plant. The processes for the production of iso-octane and alkylate from butane [were] developed almost exclusively at Leuna. . . . Leuna furthermore has carried out a large part of the research of the IG in catalytic cracking . . . and on synthetic luboils.”⁵¹

Besides these large laboratories, the group had a number of smaller ones, mostly located in Ludwigshafen, the group’s leading plant and the site of the Main Laboratory. These labs engaged, for instance, in research on energy control and production control and took on various production support functions such as product quality monitoring. Some of the smaller laboratories, however, were central to the group’s, and the IG’s, R&D program. Probably the most important of them was the High Pressure Experimental Laboratory, run by Matthias Pier, which was centered in the Lu 35, the building in which the Haber-Bosch process had been perfected earlier in the century. Administratively part of the BASF group’s ammonia division, with its headquarters in Oppau, the High Pressure Lab carried out all of the fundamental R&D associated with the hydrogenation process for IG Farben. The lab’s work included extensive basic research on hydrogenation as well as work to support licensees and the construction and operation of hydrogenation plants, mostly abroad in the first instance. Eventually, as we shall see, it was involved intimately in supporting the design, construction, and operation of hydrogenation facilities in Germany as their numbers expanded significantly beginning in the latter half of the 1930s. The lab was also involved in research work in fields (such as catalytic cracking in petroleum refining) closely related to the hydrogenation process and lubricating oil.⁵²

BASF’s initial commercial and technological successes, of course, had been in dyestuffs chemistry, in particular the synthesis of a substitute for natural indigo. Although the firm abandoned its traditional production process in this area in 1924 on the eve of the founding of IG Farben, its Indigo Laboratory continued research into products and processes associated with ethylene chlorhydrin. Product areas such as ethylene oxide, glycol, butanol, and, eventually, the solvent butyl acetate (from the group’s new Solvents Laboratory) emerged from this research by the mid- to late-1920s. Much of the key work in the latter was accomplished by Walter Reppe, who would subsequently become a key figure in the Upper Rhine group’s research establishment. During the decades that followed, the Upper Rhine group and, later, the refounded BASF also pioneered the development of a range of plastics and synthetic products that were related closely to the research of the Indigo and Solvents Laboratories.⁵³

⁵¹ “Activities of IG Farben in the Oil Industry,” pp. 166–7, quotation p. 166.

⁵² “Activities of IG Farben in the Oil Industry,” pp. 162–5.

⁵³ Otto Ambros, “Entwicklung des Aethylengebietes,” pp. 2–3 of “Niederschrift der Sitzung des Teabüros am 21. Juli 1936, BASF UA, D 583; Schuster, *Badische Anilin- & Soda-Fabrik AG*, pp. 22–3; Morris, “Ambros, Reppe.”

The amounts spent on research at the Upper Rhine group were befitting such a large R&D establishment, and they swelled considerably as a result of the continued and very expensive investment in research in the group's new areas. In 1928, basic laboratory running costs for *Sparte I* (essentially, Oppau, the High Pressure Experimental Laboratory at Ludwigshafen, and Leuna) amounted to RM 6.7 million, and this figure rose to over RM 8 million in 1929. Total costs of R&D in the group in 1928 were a whopping RM 91 million, of which nearly RM 67 million was spent on research in new areas. The following year, total research expenditures by the group dropped by about 10 percent to just over RM 81 million, indicating an early onset to the Depression, although a still considerable RM 53.5 million was allocated to new R&D.⁵⁴ The worsening of the Great Depression curtailed these expenditures severely in the years that followed, but they were very impressive indeed, with *Sparte I* R&D expenditure alone amounting to 2.4 times the total dividends paid out by the IG in 1928 and 1929.⁵⁵

Work and the Workforce

During the period between the beginning of the World War I and the establishment of the IG, the proportion of salaried employees to overall staff increased from about one-fifth to about one-quarter, indicating an increasingly important role for foremen and support staff.⁵⁶ Waged workers, though, continued to be the bulk of the workforce at the IG and at the Upper Rhine group, and their lot was subject to the extreme political and economic fluctuations of the 1920s. With the end of the unrest that characterized the early years of the Weimar Republic, however, there was a noticeable decline in membership in, and activity of, organized labor after 1924 in Germany as a whole, but also in the factories of the group. From May 1924 until 1932, for example, there was not a single additional strike in Ludwigshafen.

One of the reasons was a downturn in the number of jobs available at the core group plants even before the onset of the Depression. The total number of waged workers at Ludwigshafen and Oppau (excluding contractors' workers employed at the plants) was 14,631 in 1925, but it rose sharply to 19,272 by 1927. The following year, there was a decline to 18,105, but this number dropped sharply to 15,508 as the Depression began to make itself felt in 1929.⁵⁷

⁵⁴ Figures taken from graph: IG Farbenindustrie AG, Ludwigshafen am Rhein, "Laboratoriums- u. Versuchskosten der Sparte I," n.d. (ca. spring 1941), BASF IG, A 251/3.

⁵⁵ Calculated on the basis of Gross, *Material zur Aufteilung der IG Farbenindustrie*, Table Va1.

⁵⁶ Haber, *The Chemical Industry, 1900–1930*, p. 380.

⁵⁷ Compiled from table by BASF Personnel Department from VT, Der Mensch in BASF, C 621/2; and from contemporary tables in C62205: Sozial Entwicklung. Arbeiterstand 1897–1946, BASF UA.

The waning power and numbers of the workers and their trade-union movement is reflected in steadily – and sometimes dramatically – decreasing levels of turnover in waged staff in Ludwigshafen and Oppau. Whereas nearly one-half of the workers turned over through a combination of resignations, firings, and new hires between 1920 and 1922, less than 20 percent of total staff turned over on average between 1923 and 1925. This level declined to less than 11 percent during 1926–7, to 5.5 percent between 1928 and 1932, and to just 4 percent between 1933 and 1937.⁵⁸

The process of decline in the power and prestige of the workforce was reinforced by the fact that workers were subject to the same “rationalization movement” of German industry that had come about in response to the loss of the war and the emergence of stiff competition abroad. (It was this condition that had led in 1925 to the formation of IG Farben itself.) Indeed, reorganization of work patterns and new technologies were frequently used by management in combination with wage rises as tools to further erode the power of organized labor.⁵⁹

One main area for interest in the rationalization of work, workers, and the workplace was safety, as was reflected by the increasingly intense interest in this topic by the factory newspaper beginning in 1926. On the last page of the March issue, the first “Accident Prevention Corner” appeared. It became a regular feature, and in the late spring and early summer graphics and slogans designed to promote awareness of safety and accident prevention also commonly appeared in the newspaper. They ranged from the banal to the humorous. One early slogan, for example, advised workers to look both ways when crossing railroad tracks. Another suggested that: “Those who watch out for their hands spare themselves disability benefits.” Apparently, the idea behind the slogans and graphics was to imitate current practice in the United States.⁶⁰ In any case, the efforts seemed to pay off for the chemical industry as a whole.⁶¹

In the early years of the IG, it was possible to be cynical about the renewed concern for worker safety. One other area of positive development was less ambiguous, however: The carrot deployed to make all of the rationalization measures more palatable was a substantial wage rise at all IG Farben factories in the trust’s early years. Between late 1924 and early 1929, the cost of living in Ludwigshafen rose by just over 20 percent, but during the same

⁵⁸ “Arbeiterwechsel und Stetigkeit von 1897–1937,” Table 8, n.d. [ca. late 1930s], BASF UA, C 62205 Soziale Entwicklung. Arbeiterstand 1897–1946.

⁵⁹ Brady, *Rationalization Movement*; Shearer, “Talking about Efficiency.”

⁶⁰ *Werkszeitung Ludwigshafen*, vols. 14–18 (1926–1930). Examples of slogans are: “Musst Du Gleise überschreiten, schaue stets nach allen Seiten,” 14, no. 8 (August 1926), p. 126 (accompanies photograph); “Wer acht gibt auf die eigenen Hände, betrügt sich um die Unfallsrente,” 14, no. 5 (May 1926), p. 73. On inspiration from the U.S., “Unfallverhütung in Amerika und bei uns,” 14, no. 2 (February 1926), pp. 17–20.

⁶¹ Haber, *The Chemical Industry, 1900–1930*, p. 381.

period the average annual wage of a BASF worker rose by nearly 30 percent, from RM 2,304 to RM 2,970. What is more, the 1924 level was itself more than 40 percent higher than the average wage in 1913.⁶² As was the case in so many other areas, including production, foreign trade, and R&D, standards of living – if not necessarily conditions of work – seemed to be on the upswing in the late 1920s, a marked contrast to the early – and late – Weimar years.

During the initial years under the aegis of IG Farben, the former BASF continued to lead the new concern in production, investment, and R&D, and its leading managers and scientists therefore played a huge role in determining the trust's direction. They were understandably renowned and held in awe, not just within the IG itself, but in the global chemical industry and elsewhere.

The fragile world economy, however, had already begun to teeter dangerously in the late 1920s, and the Wall Street crash of October 1929 ushered in a new era in which the prices of key commodities produced by the group, such as petroleum and ammonia, fell to disastrous levels. The financial pressure that it and the IG faced therefore increased from extremely worrying to nearly unbearable.

3. COPING WITH THE CRISIS, 1929–1933

In the late 1920s, the German chemical industry appeared to be regaining at least some measure of the prominence it had lost on the world stage during the war and its aftermath. Starting in 1929, however, and to an increasing degree in the years that followed, the international depression had a severe impact. Although financially better able than most to withstand the maelstrom, IG Farben had also placed itself in a nearly untenable position, with the Upper Rhine group most exposed in this regard. The leaders' high-risk strategy of developing coal-to-oil technology – the main focus by a wide margin of both R&D and investment for the trust as a whole in the initial IG years – had already begun to seem dubious in 1927–8 because of falling prices for natural petroleum products. But the Depression sent those prices spiraling downward faster still. Approaching desperation, the trust's leadership was faced with two nearly equally distasteful options. Either coal-to-oil technology could be abandoned completely, or the trust could seek the aid of the government in protecting its products through heavy duties on imported petroleum.

Although synthetic fuel technology clearly stood out from other production areas of IG Farben in terms of the magnitude of the crisis it posed, prices for other commodities were also plummeting, with those for ammonia,

⁶² Calculated on the basis of figures in Braun, *Schichtwechsel*, p. 90.

one of the concern's biggest moneymakers in previous years, dropping especially far. Again, it was the Upper Rhine group that felt the effects of this nosedive more than others. What is more, it shared with the other works groups the misery of seeing prices decline across the board and world trade teetering on the brink of collapse, the latter being particularly important for an export-oriented firm such as the IG.

Reorganizing the Trust and the Group in the Wake of the Crisis

In 1930 the impressive new IG Farben administration building in Frankfurt was completed, and two of the key “sales communities” previously located at the main IG Farben production plants moved in immediately. This event marked a new stage in the centralization of the trust's sales activities and a conscious decoupling of sales from production in order to attain economies of scope in the former area. The strategy would, though, have unforeseen consequences.

Even though some progress had been made on the centralization of sales, Bosch was still dissatisfied with the continued balkanization of the trust. He was determined to use the crisis within the German economy and the concern itself to force the IG to implement measures to integrate it more fully, some of which had been under consideration since August 1929.⁶³ In particular, Bosch was concerned with two things. First, he wished to rationalize still further the highest-level management of the trust through greater concentration of powers of leadership and decision making. Second, he wished to push centralization further into the area nearest to his heart, production.

To attain the first goal, Bosch undertook yet another reform of the trust's central management in 1930–1, narrowing the still quite large “working committee” of the unwieldy managing board to just eight key managing board members (including Bosch himself) in the Central Committee, with supervisory board chairman Carl Duisberg also attending in an advisory capacity. This small group guided the operations of the IG until Bosch's retirement in 1935, after which the managing board was substantially streamlined.⁶⁴

⁶³ Bosch insisted at a meeting of the Central Committee in January 1931 “that the Depression period must be used to simplify the organization of the firm and make it more effective.” Quoted from the minutes of the meeting by Hayes, *Industry and Ideology*, p. 20. But the initial plans for the creation of the divisional structure began as a result of Bosch's initiative in August 1929 before the onset of the Depression. Ernst Struss, Affidavit, “Die Betriebsgemeinschaften und die Entwicklung der IG Farben,” August 30, 1947, p. 12, NI-9487.

⁶⁴ Hayes, *Industry and Ideology*, p. 23.

More importantly, though, by 1931, the trust undertook a major realignment in its organization of production and sales. In the future, production, like sales, was to be managed across, rather than by, the individual works groups, although the groups would continue to enjoy a high degree of cohesion and autonomy. Production and sales were to be coordinated along divisional lines, called *Sparten*. And significantly, although there were powerful men responsible for sales of particular product lines within the divisions, the overall head in each case was someone from the production side.

Division I (*Sparte I*) was the high-pressure division. It was headed very briefly (and somewhat anomalously) by the Lower Rhine group's Karl Krekeler, but the Upper Rhine group's Carl Krauch quickly replaced him. Krauch, who served as deputy factory manager at Oppau under Gaus in the initial IG period and then moved up to replace his former boss, remained in the post of divisional leader until 1938. The mounting pressures of his secondment to the National Socialist government's Four Year Plan organization in 1936 and his appointment as "Plenipotentiary-general for special questions related to chemical production" in 1938, however, eventually forced him to give up formal leadership of the division and his position in the managing board. *Sparte I* united production and sales of two major lines, synthetic nitrogen and hydrogenation, although it was also responsible for the management of the trust's coal mines. *Sparte II*, directed by Fritz ter Meer from the Lower Rhine group (formerly Bayer), was responsible for many of the traditional lines of the IG component companies, including dyes, pharmaceuticals, and various other inorganic and organic chemicals. But it also directed production and sales of some newer areas, which were to become especially important under the National Socialist regime, with its policies of autarky, or economic self-sufficiency. These included light metals, synthetic rubber, and plastics. *Sparte III*, headed by Fritz Gajewski, who had started his career at BASF, supervised production and sales of a number of related product lines, many located in central Germany and Berlin, including photographic materials, artificial fibers, cellophane and various specialized coated paper products, and explosives.

The factories of the Upper Rhine works group, like other large plants in the IG, engaged in activities that cut across more than one of the *Sparten*, although they were restricted to divisions I and II. Oppau and Leuna were placed in the former; Ludwigshafen, with the latter. In effect, then, the unintended consequence of the IG's new divisional structure, which was ordered and implemented by Bosch himself, was to further splinter the former BASF. Not only was Leuna ever more independent and not only were sales functions farmed out to the new headquarters building in Frankfurt, but now, in addition, Oppau and Ludwigshafen had entirely separate regimes for investment and production programming. In fact, Ernst Struss, the head of the IG's powerful TEA Office, claimed after the war that the Upper Rhine works group

essentially ceased to exist with the implementation of the divisional structure, except (in the form of Ludwigshafen alone) as a subdivision of *Sparte II*.⁶⁵ But this assertion was not entirely accurate. Oppau and Ludwigshafen continued to have close links through the meetings of the Directorship and through extensive personal contacts between senior managers of both facilities. Moreover, technical and academic staff at Ludwigshafen, Oppau, and Leuna continued to be identified as belonging to the Upper Rhine group into the early 1940s.⁶⁶ Nevertheless, the clear trend within the IG was indeed toward fragmentation of the group's authority and identity.

Within the IG, the Upper Rhine group's position was distinctive in at least two ways. First, it differed from other works groups in the extent of its domination of a single division, *Sparte I*. At the beginning of 1932, for instance, Oppau and Leuna together accounted for fully 86 percent of all those employed within the division.⁶⁷ What is more, virtually all of the IG's production in the areas managed by the division occurred within the group's factories, and all those occupying leadership positions within the division arose from the ranks of – and sometimes continued to occupy key management positions within – the Oppau and Leuna factories. The second distinctive aspect of the Upper Rhine group's position within the IG lay in the fact that the group's lead factory, Ludwigshafen, was situated in *Sparte II*. At the same time, though, Ludwigshafen was responsible for social and personnel policies at Oppau and also for extensive (and virtually all basic) research, development, design, and construction work for *Sparte I*.

Despite the clear dominance of former BASF factories in *Sparte I*, and despite the division's prominent role in managing its two most important product lines, ammonia and synthetic fuels, the Upper Rhine group was also heavily involved in activities that came under the responsibility of *Sparte II*, mainly through the production program at Ludwigshafen. Dyestuffs were declining in significance for the IG as a whole and for the Upper Rhine group in particular, but they were still very important to sales and, more significantly, to profits for the concern. The same was true for other traditional production lines, such as sulfuric acid. More important in the longer run, however, were a number of new and exciting areas in which the group was deeply involved. By the beginning of the 1930s, the research, development, and production of ethylene-based compounds and solvents that had been undertaken at Ludwigshafen during the mid- to late-1920s were beginning to pay off. The result was a number of new products and processes in the

⁶⁵ Ernst Struss, Affidavit, "Die Betriebsgemeinschaften und die Entwicklung der IG Farben," August 30, 1947, p. 15, NI-9487.

⁶⁶ Various volumes of "Ingenieur-Liste der BG Oberrhein der IG Farben" in BASF UA C623 (2 vols.).

⁶⁷ Calculated on the basis of figures in IG Farbenindustrie AG, Ludwigshafen, "Belegschaft der Sparte I," n.d. [ca. spring 1941], BASF IG A 251/3.

area of plastics and various materials stemming from ethylene oxide, including the highly successful antifreeze, ethylene glycol, produced primarily in Ludwigshafen and sold under the trade name Glysantin. The group's researchers were also very active in the research and development of synthetic rubbers, which would soon occupy a key position in *Sparte* II's product portfolio.⁶⁸

As might be expected, increasing centralization of sales and production planning had some impact on the organization of the Upper Rhine group. In 1930, Wilhelm Gaus, the Oppau factory manager, began to act on Bosch's behalf as the group's head and also organized its meetings of the Directorship. As we shall see, Gaus formally took overall responsibility for the group from Bosch in 1933, when, after a dispute over the future of *Sparte* I's synthetic fuels program, Gaus moved to *Sparte* II as Ludwigshafen's factory manager. Under Gaus's leadership, the meetings of the Directorship, which involved leading managers and technicians from the main works, occurred regularly from December 1930 through 1945, when the end of the war and the end of the IG trust required a change in arrangements. The institution's explicit purpose was "to come to decisions after free and open discussion in order to facilitate unified leadership in the factories of the Upper Rhine works group."⁶⁹ The group therefore still retained a certain coherence in terms of identity, coordination, technology, production, and leadership, although those ties, too, began to loosen considerably during the mid- to late-1930s under the pressures of planning and implementing autarky-related programs and war preparations.

Production Trends

Although there were a few important exceptions, the most important trend in sales and production from 1929 to 1933 was downward. Sales in the Upper Rhine group's core business, nitrogen, dropped disastrously from 1929 to 1930, from RM 502 to RM 330 million. Slumping prices, weak demand, and overcapacity on world markets only ensured that this trend continued in the ensuing years. By 1933, revenues had ebbed to less than one-third their 1928 level. Indeed, nitrogen sales had slid from over 42 percent of IG sales revenue in 1926 to just over 18 percent in 1933. In spite of some recovery from the depths of the Depression during the National Socialist period, the area

⁶⁸ Morris, "Ambros, Reppe"; Schuster, *Badische Anilin- & Soda-Fabrik AG*, pp. 23–6; Otto Ambros, "Entwicklung des Aethylengebietes," pp. 2–3 of "Niederschrift der Sitzung des Teabüros am 21. Juli 1936, BASF UA, D 583.

⁶⁹ "Niederschrift über die 1. Direktionsbesprechung in Ludwigshafen am 17. Dezember 1930," p. 1, BASF UA C13, Direktionssitzungen Ludwigshafen, 1930–1939. The two volumes of this file include all of the minutes of the Directorship's meetings from 1930 to 1945.

continued its long deterioration as a contributor to the concern's revenue, dwindling to less than 10 percent of all IG sales by 1942.⁷⁰

Not surprisingly, this alarming erosion in prices and market share prompted a closer scrutiny of IG Farben's entire investment policy for nitrogen. An internal IG memorandum of February 1931 – most probably stemming from a member of *Sparte II* – came to devastating conclusions on this score. The impressive-looking sales of 1929, the memo argued, had to be revised somewhat downward because they included RM 32.5 million in goods and services that were due only to accounting procedures. Actual sales were only RM 469.4 million, which covered only 70 percent of the capital invested in the plants for producing nitrogen. The case was similar for the profits from these sales, which purportedly amounted to RM 475 million between 1926 and the third quarter of 1930. These "pure profit" figures, it turned out, did not take into consideration the expenditures for research and pilot plants in new areas, which at Oppau and Leuna totaled RM 248.9 million during this same period. If one subtracted these outlays – which justifiably should be attributed to the nitrogen branch's accounts – as well as various taxes that were simply ignored in the overall figures from the "pure profit," only RM 158 million remained "at the disposal of the IG."

The author of the memo was not finished yet. He insisted that the interest costs on the capital invested be included. This sum amounted to RM 150 million. And, since there were also dividends paid out during this period, this analyst came to the following conclusions:

1. There was no possibility of financing other projects within the IG from the "profits" of nitrogen sales since they were virtually nonexistent.
2. Nitrogen "profits" could not even finance the running costs and expansion of the nitrogen program itself.
3. The recent, substantial losses to the firm in the artificial fiber area had not been financed from nitrogen-related sales and "profits." Instead, it had been necessary to cover them from other sources, in particular from surpluses in the areas of dyestuffs, chemicals, and pharmaceuticals.⁷¹

Similar developments – regressive prices and a fundamental skepticism about the value of the investment itself – were also afoot concerning the Upper Rhine group's other major product line, synthetic gasoline, although here the critique and opposition came not only from the other *Sparten* but also from high within *Sparte I* itself. Early in the trust's existence, IG Farben had committed massive sums in the expansion of the Leuna works, much of the money being earmarked for expansion and development of the coal-to-oil

⁷⁰ Marsch, "Strategies for Success," p. 68. The figures quoted are for the IG as a whole since virtually all of its nitrogen was manufactured within the Upper Rhine group.

⁷¹ Internal memorandum (D./S.), February 11, 1931, 5 pp., GARF, Moscow, IG Farben 1457-57-548, Stickstoffproduktion – moderne Technologie.

process. Through these investments, production costs declined markedly, from RM 471 per metric ton in 1930 to about RM 255 per ton in 1932–3. This achievement was certainly impressive, and the Upper Rhine group was well on its way to its target costs of under RM 200 per ton.⁷²

The main problem, however, was that world oil prices declined even faster owing to the Depression and to the discovery of a vast oil field in East Texas in late 1930. As a result, the world market price for crude oil, which stood at \$1.30 per barrel, rapidly fell to just 5 cents, corresponding a meager RM 1.56 per ton. This comparison, though arresting, is somewhat misleading since Leuna's output was not crude oil, but gasoline. But even so, Leuna's costs of production were more than twice the market price (including profits for the other firms!) of imported gasoline.⁷³

In light of these figures, the losses at the synthetic gasoline plant, which were already substantial despite huge injections of money through the Standard Oil of New Jersey agreement of 1929, skyrocketed between 1930 and 1932. During this period, Leuna lost RM 45.2 million on top of the RM 85.2 million in red ink chalked up between 1924 and 1929.⁷⁴ And given the scale of the East Texas find and growing proven reserves in the Middle East, the losses showed no sign of abating. Within the concern, there was naturally considerable discussion of cutting its losses, with many people in works groups outside the Upper Rhine and in divisions outside *Sparte I* arguing this case most strongly. But unlike the example of nitrogen, there was also high-level internal opposition in this instance.

In a strictly confidential personal memorandum of June 1932 to Bosch on the question of whether to continue or halt the IG's activities in the hydrogenation of coal, no less a figure than Wilhelm Gaus favored withdrawing from the technology. With his detailed analysis of the issue, Gaus concluded that:

After a careful consideration of all of the factors affecting the calculation of profits, I do not see any reason at all to support the expansion of gasoline production. *I have therefore in fact decided to recommend the complete shutdown of gasoline production. Whether it should be resumed again in better times is a question to be decided later.*⁷⁵

⁷² "Produktion und Gestehkosten Leuna," June 27, 1947, BASF UA, Pier Akten 49; Stranges, "Germany's synthetic fuel industry," pp. 183–4.

⁷³ "Produktion und Gestehkosten Leuna," June 27, 1947, BASF UA, Pier Akten 49; Stranges, "Germany's synthetic fuel industry," pp. 183–4, 207–8. Calculations of prices per ton in RM are based on the following conversion factors: One metric ton of oil is the equivalent of 7.42 barrels; one U.S. dollar was the equivalent of RM 4.2 at that time.

⁷⁴ "Kosten der Hydrierung," June 30, 1947, BASF UA, Pier Akten 49.

⁷⁵ W. Gaus to Bosch et al., June 21, 1932, with "eine streng vertrauliche persönliche Stellungnahme zu der Frage: 'Fortführung oder Stilllegung der Benzinfabrikation?'" attached, p. 11, BASF UA, Material zur Firmengeschichte, A 25. Emphasis in the original.

Coming from Gaus, who had been involved closely with the hydrogenation project since its inception, this statement was stunning. But it was not one that Carl Bosch, still at the helm of the IG, was prepared to accept. Bosch, after all, was not only a dyed-in-the-wool BASF man; he was also deeply committed to hydrogenation as an extension of the high-pressure synthesis that he himself had helped develop and for which he and Friedrich Bergius were to share the Nobel Prize in chemistry in 1931. Consequently, Gaus was made to pay for his disloyalty through his banishment from *Sparte I* to *Sparte II*. It was for this reason that he took over formal control of the Ludwigshafen plant in 1933. Within the trust itself, Bosch deployed his influence along with his other powers to argue convincingly that closing Leuna would not only cost enormous sums but would also stop development of promising production lines in its tracks. Outside the concern, Bosch and his deputies determined to use their influence to seek state aid, and by mid-1931 had managed to obtain tariffs on imported petroleum and petroleum products to protect the mammoth Leuna investment. Bosch's successful quest for state aid is detailed in the section entitled "Politicization of the German Chemical Industry and the Upper Rhine Group."⁷⁶

Although the production lines of *Sparte I* encountered severe turbulence as a result of the Depression, other areas of production in the group demonstrated considerable variation during these same years. One promising and formerly lucrative area of development during the initial IG period, the design and construction of plants commissioned by other companies, collapsed completely. Engineers and designers from the Upper Rhine group continued work on two hydrogenation facilities in the United States financed by Standard Oil of New Jersey through 1930, but otherwise they had no contracts outside the IG trust. Not until 1934, with the pursuit of autarky policies under National Socialism (and by regimes in Japan, Spain, and Italy in particular), did this business begin to boom again.⁷⁷

Like nitrogen, however, dyes and dyestuffs intermediates, the original basis of the German organic chemical industry, continued to wane during the 1930s, tapering from about 33 percent of IG Farben's total sales at the beginning of the decade to 16 percent by 1940. The Upper Rhine group fared even worse than others, seeing its share in the IG's total dyestuffs sales drop from nearly half in 1930 to one-third by 1940, and just over a quarter two years later. During the Depression years themselves, however, dye-related sales held up surprisingly well for the former BASF plants and for the IG as a whole, helping the trust weather this crisis. Remaining fairly static while revenue for the trust as a whole fell considerably, their proportion of total

⁷⁶ Hayes, *Industry and Ideology*, pp. 38–42; "Der Stand der Hydrierung Ende März 1932," March 23, 1932, BASF UA Pier Akten 39.

⁷⁷ "Von der BASF in Deutschland und im Ausland gebaute Anlagen," n.d. [ca. 1962], BASF IG, R 01/1.

sales actually rose in the short term, from just over 30 percent in 1928 to nearly 36 percent in 1932.⁷⁸

By contrast, general chemical sales lagged less dramatically, but still significantly, as a result of the Depression. Overall sales of chemicals amounted to RM 23.3 million in 1928 but only RM 14.9 million by 1932. The Upper Rhine group's share was around 10 percent at first, but it gained slightly in the initial Depression years. This advance appears to have been due largely to demand for several of the group's newer and specialist product lines, including solvents, softening agents, and artificial resins (rudimentary plastics), which remained unusually buoyant despite the Depression.⁷⁹

Downsizing

With prices for many product lines in free fall and little prospect of immediate improvement, radical cost cutting became the order of the day for most companies. Even a concern as large and financially powerful as IG Farben felt the pressure. Moreover, despite liquidating most of its financial reserves in the course of the Depression, the IG was forced to slim down its operations considerably.

When companies consider stabilizing their operations during an economic downturn, they have a number of options available to them. They can sell off assets, make their production and other operations more efficient, eliminate nonessential expenditures and frills, and/or lay off part of the workforce. Given the scale of the crisis the IG faced in the early 1930s, the first two alternatives were not of much use. Buyers for assets were in very short supply, and the potential sums raised through sell-offs were paltry in comparison to the guaranteed and long-term losses of productive capacity to competitors. More efficient operations are always desirable, but, again, the payoffs from following this tack would be relatively modest in the short term compared to the savings required immediately. Only elimination of "nonessential" expenditure and a resort to mass layoffs promised the kinds of savings that the IG leadership believed were required to stabilize the firm in the wake of the crisis.

Business travel, donations to charities, and so on could be trimmed back considerably as "nonessential expenditure." But by far the biggest items in this category were two sets of expenditures in particular: investment in plant, some of which might be postponed, curtailed, or eliminated altogether; and funding for R&D, especially in new areas and in the very expensive (and apparently not very lucrative) hydrogenation field.

⁷⁸ Dr. H. Rötger, "Anteil des Farbstoffgeschäfts am Gesamtumsatz IG und BASF," February 24, 1967, Table 13, BASF IG, T 01/1.

⁷⁹ Dr. H. Rötger, "Chemikalien-Umsätze der IG und der BASF 1928–1934," May 27, 1966, Table 3a, BASF IG, T 01/1.

Investment was therefore slashed to a bare minimum. From 1930 through 1932, the Upper Rhine group's Leuna plant continued to enjoy the highest level of investment of all factories within the IG. But, with funds amounting to just RM 26 million during this three-year period, the level stood at about 10 percent of what it had been for Leuna during the four-year period from 1926 through 1929. The amounts flowing to Ludwigshafen and Oppau during the key years of the Great Depression were also minuscule compared to what they had been.⁸⁰ With good reason, high-pressure chemistry was viewed as one of the IG's most costly areas of investment, and therefore one of the most likely to yield large savings through cutbacks.

R&D formed another source of huge potential savings, with the costly projects of the research labs in *Sparte I* a prime target. In 1930, the division's expenditures on research continued to be quite high, at over RM 56 million (with RM 36 million of this amount being spent on new projects). But as the Depression deepened during 1930–1 and as prices for oil and ammonia slumped still further, the reductions in R&D expenditure within the division were ruthless. Overall expenditure on research within *Sparte I* declined in 1932 to less than a fifth of the 1930 level. As one might expect, much of the key retrenchment was in R&D related to new processes and products, outlays for which diminished from RM 36 million in 1930 to just RM 1.9 million in 1932. During the same time, savings also came about through layoffs of lab staff and through hiring freezes.⁸¹

Despite these massive curtailments, the Upper Rhine group still made considerable progress in key and promising areas during the early 1930s. Starting in 1929, the Main Laboratory at Ludwigshafen was the scene of research into acrylics and their polymers, which was related in terms of technology and materials flow to ethylene chemistry and methanol synthesis. Eventually, this work would lead to processes for polymerization of monomers such as vinyl chloride (into polyvinyl chloride, or PVC, an extremely versatile plastic) and acrylonitrile (into polyacrylonitrile, or PAN, which had a variety of applications, especially as a synthetic fiber). Between 1930 and 1935, another group of researchers at the Main Lab was developing and bringing up to industrial scale processes for producing styrene and polystyrene. Still other research work included process development related to polymerization of ethylene into polyethylene, which eventually received the trade name

⁸⁰ "Investments for large plant of IG in millions RM," August 18, 1945, PRO Kew, FO 1031/233. These figures are broadly supported for the Oppau and Leuna plants by those presented in documents produced during the war: IG Farbenindustrie AG, Ludwigshafen, "Neuanlage Merseburg in Mill. RM," n.d. [ca. spring 1941], BASF IG, A 251/3; IG Farbenindustrie AG, Ludwigshafen, "Neuanlagen Oppau in Mill. RM," n.d. [ca. spring 1941], BASF IG, A 251/3.

⁸¹ "Laboratoriums- und Versuchskosten der Sparte I," n.d. [ca. spring 1941], BASF IG, A 251/3.

Lupolen, and, beginning in 1931, development of a very successful industrial adhesive, Kaurit.⁸²

At the beginning of the 1930s, however, the payoffs for these extensive efforts in R&D lay in what seemed at the time an extremely uncertain future. In the short term, the layoffs and hiring freezes associated with the Upper Rhine group's research establishment painfully affected those involved. What is more, the smaller numbers of staff pursuing research with ever smaller budgets had the effect of slowing down the scientific and technical progress that had been so rapid within the group through the late 1920s. But in terms of sheer scale, the shrinkage of the workforce as a whole during the Depression far surpassed what was happening within the research establishment.

Total employment at the core factories at Ludwigshafen and Oppau, which had stood at nearly 24,000 on the eve of fusion in 1924, swelled to over 26,100 by 1928. But by 1931, the group employed only 14,700, and that figure fell still further to a low point of 12,300 in 1932.⁸³ Waged employees, the largest proportion of the total, were direly affected by the Depression. As noted in the previous section, the total number of waged workers (not including contract labor) peaked in 1927 and stood at 15,508 in 1929. In the early 1930s, this figure continued downward, bottoming out at 8,617 in 1932.⁸⁴

Not only were the numbers of workers reduced dramatically, so were the number of hours worked by the group's remaining workforce. The directors heard at their first meeting on December 17, 1930, that fully 85 percent of the group's workers were working shortened hours. Essentially, in order to avoid even more serious job cuts, the average work week of 48–56 hours was scaled back to 40 hours, where it remained until well into the 1930s.⁸⁵

These rigorous cuts had immense ramifications for the surrounding region. The Upper Rhine group, after all, was the largest employer by far in Ludwigshafen and Oppau, and its unsparing contraction hit hard. The number of unemployed persons per 1,000 population in Ludwigshafen soared from just under 50 in 1929 to 110.6 in 1932. The city was thus much more

⁸² Schuster, *Badische Anilin- & Soda-Fabrik*, pp. 23–4.

⁸³ Dr. H. Rötger, "Umsatzanteil pro Belegschaftsmitglied in Mark," Table 1, n.d. [ca. 1964], BASF IG, T 01; Veit Damm, "Carl Wurster, Chemiker und Manager," p. 13; Braun, *Schichtwechsel*, p. 92. The figures in each of these sources vary slightly from one another, but the orders of magnitude are similar.

⁸⁴ Compiled from table by BASF Personnel Department from VT, *Der Mensch in BASF*, C 621/2; and from contemporary tables in C62205: *Sozial Entwicklung. Arbeiterstand 1897–1946*, BASF UA.

⁸⁵ "Niederschrift über die 1. Direktionssitzung in Ludwigshafen am 17. Dezember 1930," p. 3, BASF UA C 13, *Direktionssitzungen Ludwigshafen 1930–1939*; "Maßnahmen der IG Farbenindustrie Aktiengesellschaft zur Bekämpfung der Arbeitslosigkeit," *Werkszeitung IG Farbenindustrie AG Werke Ludwigshafen* 21, no. 11 (November 1933): 102.

heavily affected than the Reich as a whole, for unemployment in Germany at large rose from 29.1 per 1,000 in 1929 to 85.6 per 1,000 in 1932.⁸⁶

As the crisis worsened and persisted, it soon became clear that something had to be done at the local level to combat these problems. Unmarried, unemployed youths were identified as most at risk. They were viewed as being possessed by a “pressing need for activity” that, left unchanneled, would lead them to the streets and thus pose grave dangers to society. They were also identified as “the future of our nation,” as holding the key to “decisions on the future of our German Fatherland.” Following the lead of the central German Wolfen-Bitterfeld district, in which another large IG Farben complex was located, IG Ludwigshafen, in cooperation with the city authorities and local Protestant church organizations, established a workshop for the unemployed in May 1931. Factory management provided a rudimentary building and funding, lent machinery, and donated scrap materials. The building was located on city land and renovated by an initial contingent of 18 youths, whose numbers proliferated in the following weeks. By the autumn the group had outgrown its accommodation, and IG Ludwigshafen provided a second building for its use. The youths turned out a variety of items, including toys, rabbit stalls, sleds, tables, lamps, and writing utensils, and in late October and early November 1932, the workshop put on an exhibition of its products.⁸⁷ To be sure, the establishment of the workshop for the unemployed was a noble effort, but it could do little to attack even the symptoms of the escalating problem. After all, in 1932 the official number of unemployed in Ludwigshafen was 11,874.

But what provision was made for substantial number of those who continued to be employed in the group? It is clear that the mass layoffs and shorter work hours depressed the standard of living and the morale of the workforce. Alterations in the tone and substance of the factory newspaper indicated the attempts by management to help them come to terms with the economic crisis. During 1931, the newspaper continued its policy of providing a mixture of general news about science, technology, and the activities of various IG factories; self-help and entertainment; and practical tips and exhortations about accident prevention. And through 1931, it remained focused primarily on the core factories of Ludwigshafen and Oppau (the factory at Leuna had its own newspaper). One entirely new development, however, was a noticeable increase in images and articles about German nature and *Heimat*, a virtually untranslatable German word evoking warm images of rootedness and belonging. The cover of each issue of the newspaper now generally provided a romantic view of the German countryside in a series of

⁸⁶ Meinzer, *Stationen und Strukturen*, p. 157.

⁸⁷ “Die Ludwigshafener Arbeitslosen-Werkstatt,” *Werkszeitung IG Farbenindustrie AG, Werke BASF Ludwigshafen* 19, no. 11 (November 1931): 167–8; “Ausstellung in der Arbeitslosen-Werkstätte,” 20, no. 12 (December 1932): 119.

“German *Heimat* pictures.” A further novelty was that the workforce was also now the subject of some gentle advertising for BASF products and for those of the IG more generally. Photographs now usually noted not just the subject of the picture and the photographer but, for the most attractive of the images, also the variety of Agfa film used to produce them. Short feature articles began to bring particular products to the attention of the workers. This aim was true especially for automobile-related goods, such as products for antifreeze protection or for help with starting gasoline engines in the winter, although the relatively low level of car ownership in Depression-era Germany gives reason to question the effectiveness of this advertising campaign. In 1932, moreover, the newspaper began to be printed on higher quality magazine-style paper, which was brighter and allowed superior reproduction of photographs. Finally, in a clear bid to further promote a sense of IG rather than local identity, news of the jubilees, deaths, and retirements in all of the IG works groups began to appear in the newspaper beginning in 1932.⁸⁸

Politicization of the German Chemical Industry and the Upper Rhine Group

IG Farben, Germany’s largest corporation by 1926, was from the outset probably more entangled in political life than most other firms. It tried to shape public opinion and legislation in its favor through media manipulation and contributions to political parties. But despite all of this (mostly covert) political activity, the main focus of the trust and its leadership in the late 1920s was on the expansion of its business, on development of new product lines, on integration of the component firms, and on relations with foreign firms and markets. In other words, in spite of important political dabbling, the young IG’s chief concern was to look after its direct business interests.

However, the collapse of the world economy and the swift erosion of sales and profits, in particular in the areas of high-pressure chemistry pursued at the Upper Rhine group, altered the relationship between business and political interests within the trust, with the latter moving from the periphery to the center. One sign of this shift was the ascendancy and expansion of Berlin NW 7, a trust staff organization known by its postal code. Guided largely by Max Ilgner, its deputy director, the staff had initially restricted itself from its founding in 1929 until 1932 to producing studies of general financial and

⁸⁸ *Werkszeitung IG Farbenindustrie AG, Werke BASF Ludwigshafen* 19 and 20 (1931 and 1932). For advertisements, see “Anlassmittel IG für den Benzинmotor im Winter,” 19, no. 12 (December 1931): 186; “Der Frostschutz für das Autokühlwasser,” 20, no. 1 (January 1932): 8. See also “Blumen düngen – aber richtig. Einiges über Huminal-Tabletten,” 20, no. 12 (December 1932): 123, which concerns a product developed at the Limburg agricultural research station.

commercial developments around the world as they affected IG Farben through its Department of Political Economy (*Volkswirtschaftliche Abteilung*, or Vowi). But the Depression provided opportunities for the expansion of NW 7's activities. A new Economic Policy Department (*Wirtschaftspolitische Abteilung*, or Wipo), was formed in 1932, and it produced reports that were specifically linked to issues connecting the IG and the government, such as taxation, the law, and foreign economic policy. Governmental agencies relied quite heavily on these professionally prepared studies, which drew on the considerable talent available at NW 7's main offices in Berlin and on the IG's worldwide sales network and international contacts.⁸⁹

Neither the personnel nor the organization of NW 7 was directly connected to the numerous IG works groups, although both were affected by the forces that led to the creation and expansion of NW 7. The Upper Rhine group was certainly no exception to this general process of politicization, in particular owing to its activities in high-pressure synthesis of ammonia and gasoline.

To combat the threat that declining prices and shrinking demand posed to treasured product lines, Bosch led the IG in seeking governmental protection. The Weimar regime had already been generous in giving Leuna aid for development of oil production “through tax abatements and reduced transport rates on the national railroads.” In May 1931, however, the accumulating financial strains brought about by the Depression led Bosch to seek additional protection for synthetic fuels and synthetic ammonia by meeting with Reich Finance Minister Hermann Dietrich. Bosch's views were, moreover, supported by other producers, including the benzene and nitrogen manufacturers in the Ruhr. On June 5 the Brüning government accordingly promulgated an emergency decree that raised customs duties on most imported oil products by 70 percent, amounting to the highest protection levels in Europe. The decree also “authorized subsequent changes in the market regulations and tariffs governing nitrogen.” Duties on nitrogen products, previously nonexistent, were announced on July 14. On August 17, the government blocked all imports of nitrogen, in effect causing the international nitrogen cartel to collapse.⁹⁰

By the early 1930s, there were several other indicators of intensified politicization at the Upper Rhine group. One of the most important occurred at the broadest and most fundamental level: the radicalization of the workforce and the rise in support for extreme parties. In the institution of worker representation at the factory level – the works and workers' council (*Betriebs- und Arbeiterrat*) – and in local and national elections between late 1929 and late 1932, more and more people voted for Communists or National

⁸⁹ Hayes, *Industry and Ideology*, pp. 30–1. Max Ilgner, in a statement dated June 18, 1945, indicated that NW7 provided considerable additional assistance to the German state, especially during the National Socialist period, through the intelligence-gathering capabilities of its external sales network. See the remarks reproduced in Sasuly, *IG Farben*, pp. 274–86.

⁹⁰ Hayes, *Industry and Ideology*, pp. 40–1.

Socialists, although support for Hitler's far right-wing party was relatively slight at the local and workers' representative levels. In federal elections for the Reichstag, voters in Ludwigshafen supported workers' parties, with the Social Democrats and the Communists sharing more than 40 percent of the vote. As the Depression deepened, however, the communists' share of the total vote rose somewhat, from 13.5 to 18.7 percent, but a solid bloc of about 33 percent of all voters supported the moderate SPD. Moderate Catholic parties also had a relatively stable base of support, amounting to 18 or 19 percent of the total vote. But although support for the National Socialists was fairly weak in Ludwigshafen in 1929, it surged alarmingly as the Depression proceeded. By 1932 nearly 30 percent of the electorate cast their votes in Reichstag elections for Hitler's party.⁹¹

The last local government elections in Ludwigshafen before the National Socialist seizure of power in January 1933 were held in December 1929. As might be expected, there was relatively thin support for the extreme parties at that point. The parties of the center, including the SPD, the Center Party, and the associated Bavarian Peoples' Party, held 22 of 40 seats in the city council, whereas the National Socialists and the Communists held just three each. Elections to the Rhineland Palatinate provincial assembly in April 1932, however, indicated increasing sentiment for radical parties. Nearly 33 percent of the voters in Ludwigshafen cast their ballots for the National Socialists, whereas 13.5 percent supported the Communist Party.⁹²

Significant growth in levels of support for the National Socialist Party at the local level was in marked contrast to patterns at factory level, where support for left-wing parties was more in evidence. The 1929 elections to the works and workers' council featured the first candidates from the communist-led Revolutionary Trade Union Opposition (*Revolutionäre Gewerkschaftsopposition*, or RGO). The RGO in Ludwigshafen attracted approximately 20 percent of the vote in that election, a level of support that receded to 17.9 percent in 1930, although the RGO was far more successful at the Leuna works in Merseburg. The more moderate free trade unions, on the other hand, managed to hold the clear majority (approximately 60 percent) of seats and votes in both the institutions of worker representation in Ludwigshafen. The workforce's support for the Nazi Party was relatively modest, despite the party's desperate attempts to appeal to workers. Nazi candidates did not even run for the works and workers' council until 1930, when they attracted just over 6 percent of the vote and won a single seat.⁹³

The relatively low levels of support within the Upper Rhine group's workforce for the National Socialist Party did not, however, prevent party members from high-profile activities within the factories. Their prominence was

⁹¹ Braun, *Schichtwechsel*, pp. 94–5.

⁹² Braun, *Schichtwechsel*, pp. 94–5; Meinzer, *Stationen und Strukturen*, p. 161.

⁹³ Braun, *Schichtwechsel*, pp. 95–6.

especially apparent in spring 1932, when two successive meetings of the Directorship of the Upper Rhine works group were forced to deal with issues related to the Nazis. On March 16, Wilhelm Gaus reported to the group that he had spoken with the leader of the National Socialist cell in Ludwigshafen regarding allegations of planting bombs in the Pfalz, “and urgently insisted that all partisan activity and propaganda within the factories cease.” The following week, Gaus read to the directors a letter addressed to Bosch himself. Its allegations about high levels of National Socialist propaganda at Ludwigshafen and Oppau moved one of the other directors, Hans Keller, to make clear “that it has been repeatedly brought to the attention of factory representatives that any party propaganda within the factories would not be countenanced, regardless of which side it came from, and that intervention would be immediate if positive evidence came to light.” Keller and another director, Ernst Schwarz, would investigate these allegations further.⁹⁴

As it turned out, the Upper Rhine group was involved in this affair to a remarkable degree. Materials for construction of explosives by National Socialist bomb makers were taken from Oppau’s building number 99, an action made possible by party members, including the foreman. Their intention was to use the bombs in a civil war against the communist KPD. In the event, rival factions within the National Socialist Party blew up the one bomb they had constructed on the night of June 21–22, 1931, and the police soon discovered who was behind the plot.⁹⁵ This incident was a minor and mildly comical one, but it was also an indication of the extent of radicalization of the working population and of the fact that this radicalization had reached far inside the gates of the Upper Rhine group factories. The fact that the group and the trust of which it was a part were increasingly entangled in the sometimes chaotic and usually dangerous party politics of the late Weimar era made such developments even more worrying. The group’s leadership nevertheless believed this politicization of their business, regrettable as it was, would soon pass, and that normality would ensue with inevitable economic recovery and political stabilization. It was not long after the appointment of Adolf Hitler as Reich Chancellor on January 30, 1933, that they discovered just how mistaken they were.

4. ACCOMMODATION AND CONFLICT, 1933–1936

Hitler’s seizure of power in the first months of his chancellorship and the consolidation, or *Gleichschaltung*, that followed placed the members of the Upper Rhine group’s leadership in something of a quandary. On the one

⁹⁴ “Direktionssitzung in Ludwigshafen am Rhein am 16. März 1932,” p. 1; “Direktionssitzung in Ludwigshafen am Rhein am 22. März 1932,” p. 1, both in BASF UA C13 Direktionssitzungen Ludwigshafen 1930–1939.

⁹⁵ Meinzer, *Stationen und Strukturen*, p. 58.

hand, as traditional, moderate political conservatives for the most part, they implicitly distrusted Hitler and his henchmen. The Nazi Party, for its part, did little to endear itself to them; indeed, the National Socialists continued their attacks on IG Farben as an internationalist, Jewish organization even after they seized power. On the other hand, the new government also held out great promise to industry, in particular to those sectors that could make Germany more self-sufficient and/or prepare it for war. In this regard, the Upper Rhine group was in an especially enviable position, offering as it did potential German self-sufficiency in oil and, in conjunction with other groups within the IG, eventually also in rubber. By summer 1933, furthermore, the Nazis had demonstrated that they had a “cure” for the traditional animosity between industry and the trade unions: effective elimination of the latter. Industry for the most part was pleased with many aspects of the Nazi program.

All of these advantages, however, were attained at the cost of extensive loss of control for the Upper Rhine group’s management. Government aid guaranteed income and even profits, but it also tied the group more closely than ever before to the political sphere and to the internal German market. The German Labor Front (DAF) – the National Socialist institution of labor management – may have controlled the workers to an impressive degree, but it also pursued an agenda somewhat different from that envisioned by management. The politicization of life within the factory gates thus not only continued from the late Weimar period; it intensified. By the end of the initial period of National Socialist rule (1933–1936), the prospect of having to surrender even more control loomed. The beginnings of intensive war preparations meant that state intrusion into the affairs of the group was likely to increase, and autarky policies in preparation for war were testing the limits of the group’s ability to maintain any remnants of its internal coherence.

The National Socialist Seizure of Power, the Trust, and the Group

The breath-taking speed of the National Socialist seizure of power in Germany is graphically illustrated in editions of the Ludwigshafen-Oppau factory newspaper. Despite strong evidence of increasing political activity in the factories themselves during the early 1930s, the newspaper had, understandably and in keeping with its traditions, taken a deliberately apolitical stance. The same held true for the first four months of 1933, which included the first three months of Hitler’s reign. With the May–June issue, however, this practice changed rather abruptly. In a dramatic gesture, Hitler had named the traditional workers’ day, the first of May, a national holiday celebrating “German work.” The celebrations at the BASF main factory in Ludwigshafen were kicked off on May 1, 1933, with a horn signal at precisely 8 a.m. They were attended not just by the workforce, but by the entire Directorship,

an indication of the significance of the event. Also in attendance, however, was a “brownshirt brigade,” composed of members of the local and factory SA (*Sturmabteilung*, the storm troopers), SS (*Schutzstaffel*, or elitist guard), and the National Socialist Factory Cell Organization (*Nationalsozialistische Betriebszellen-Organisation*, or NSBO). During the opening ceremony, the main speaker mentioned World War I, the German defeat in 1918, the new “people’s community” (*Volksgemeinschaft*), and Hitler himself, ending his speech by leading the crowd in a threefold “*Siegheil*” to the “people’s chancellor.” A picture accompanying the article also showed two National Socialist flags, although it is perhaps significant that they were not yet fully unfurled.⁹⁶

After this outburst of coverage of the new workers’ holiday, the factory newspaper once again fell silent with regard to the earthshaking political events of summer 1933, when all trade unions were replaced by the DAF and political parties except for the National Socialist Party were dissolved or rendered powerless. In November, however, this silence was irretrievably broken when the paper printed a synopsis of a speech by Dr. Robert Ley, the head of the DAF and a former chemist at IG Farben. In a speech entitled “The Labor Front and the Construction of a Corporate Society,” Ley announced, among other things, that “the current state...is an authoritarian state,” which he clearly saw as a good thing. In the same issue, an article on a recent exhibition put on by the local workshop for unemployed youths in Ludwigshafen (an exhibition, the newspaper announced, which had now become an annual “tradition”) featured a picture of a number of swastika-adorned items produced by the young men. The text also took pains to point out “the picture of the Führer, Adolf Hitler,” painted by a young local painter who had come to teach in the workshop.⁹⁷

The November issue was a harbinger for the future. During 1934, overtly political articles appeared with increasing frequency in the factory newspaper. By the June issue, a swastika figured prominently on the masthead of the paper, along with the legend that it was “edited in cooperation with the DINTA [German Institute for Technical Training] of the German Labor Front.”⁹⁸ Clearly, the factory had begun to lose control of this direct means of communication with its workforce, a process that was completed by the end of 1934. In January 1935 the first issue of the newly christened monthly

⁹⁶ “Der Feiertag der deutschen Arbeit,” IG Farbenindustrie AG Werk Ludwigshafen, *Werkszeitung* 21, no. 5–6 (May–June 1933): 60–1.

⁹⁷ Robert Ley, “Arbeitsfront und ständischer Aufbau,” IG Farbenindustrie AG Werke Ludwigshafen, *Werkszeitung* 21, no. 11 (November 1933): 104–6, quotation p. 104; “Erwerbslose stellen aus,” *ibid.*, p. 109.

⁹⁸ *Ibid.* DINTA, which was established at the behest of heavy industry in 1926, declared that human labor was the “primary production factor in the factory” and used such rationalization measures as instruction and motivation in order to achieve its goals. DINTA had already entered the National Socialist camp for the most part before the seizure of power.

newspaper of the IG Farben “Works Community” (*Werkgemeinschaft*), entitled “*From Works to Works*,” was published with great fanfare. The editors announced that “the factory newspapers, which have hitherto appeared separately in each of the works groups of the firm, have now also been standardized in their external appearance and have been turned into a unitary organ of the entire works community of our firm.” The purpose of this change was to fulfill “the National Socialist challenge” by bringing “the people in our IG, to which, of course, all ultimately belong, closer to one another.”⁹⁹

The publication of the first issue of *From Works to Works* signaled a turning point, not just for the newspaper but also for the firm. From this point on until the end of the IG itself, the newspaper of the former BASF core factories was identical to that produced in all other IG factories, except that it included the legend “Factory Newspaper of BASF” in the masthead. The level of ideological indoctrination had become extreme. Ironically, the new version of the newspaper centralized the information flow and corporate identity to a degree that had eluded the IG Farben management up to that point. It also indicated management’s loss of full control over the newspaper’s content.

Not surprisingly, while this was going on at the factory level, the IG Farben concern was itself moving gradually, but ineluctably, toward its fateful entanglement with the new regime’s political agenda, with the Upper Rhine group standing at the center of this process. In the context of the Great Depression and falling prices for oil and other materials, the group’s impressive capabilities for producing a variety of strategic materials from German coal lost much of their luster within the trust as a whole. The losses even provoked a sense of crisis since, even after extensive cutbacks in the workforce and R&D outlays, and even with the aid afforded by the late Weimar governments, the red ink continued to flow heavily within *Sparte I*. But since the group’s productive and engineering capabilities were potentially so appealing to the Nazi regime, it appeared that there might be a way out of the morass. And as it turned out, in classic and tragic fashion, the IG and the Upper Rhine group got what they desired, but both much more and much less than they bargained for.

It all started innocently enough with a series of maneuvers designed to protect the trust’s flanks in the early months of National Socialist rule. Having initially shown only lukewarm support for the new regime and its leader, the IG set out to underscore and reinforce its allegiance by increasing its financial contributions. In June 1933, Wilhelm Gaus, by now the Ludwigshafen factory manager (*Betriebsführer*) and the overall leader (*Oberleiter*) of the Upper Rhine Group, announced to the Directorship that “the IG had participated in the Hitler Fund by donating 0.5% of total salary and wage costs; the

⁹⁹ IG Farbenindustrie AG Werke Ludwigshafen, *Werkszeitung* 22 (1934); “Zum Geleit!” Von Werk zu Werk. *Werkszeitung* der BASF 23, no. 1 (January 1935): 1.

amount resulting from this percentage reached nearly a million marks.” The generosity of the donation was also intended to protect the group from the annoyances of local party officials. As Gaus continued: “Thus, other requests for support, including those from local offices of the National Socialist Party, should be considered to have been satisfied.”¹⁰⁰ This IG contribution to the Hitler Fund was only one of many “donations” that the trust made to the National Socialist Party and its causes during 1933. The total amount approached RM 4.5 million in all.¹⁰¹

More important for the group and the trust, however, was the pressing need to stabilize the finances of its two main product lines, nitrogen and synthetic fuel. The necessary measures would require accommodation with the other members of the Nitrogen Syndicate (mainly Ruhr coal companies that had branched out into nitrogen production) in order to fend off an impending price war. At the same time, the trust needed to stabilize price levels for its output of synthetic gasoline. These two goals were related partly because Ruhr coal producers were interested in expanding into hydrogenation in order to make use of by-products of the coking process. IG Farben thus offered both technical assistance with hydrogenation and concessions on the conditions of membership in the Nitrogen Syndicate in order to avoid a ruinous price war.¹⁰²

This agreement with Ruhr coal magnates did not, however, solve the fundamental problem associated with the Upper Rhine group’s production of synthetic gasoline: In spite of tariff protection, Leuna gasoline was still losing money. Obviously, the new regime’s economic and politicostrategic interest lay in promoting the use of domestic raw materials, so the idea of appealing to that interest to save Leuna was self-evident.

In June 1933, the trust’s position on this issue was set out in a paper written by a team led by the Upper Rhine group’s Carl Krauch, with apparent input from Bosch himself. Entitled “The German Fuel Economy,” the paper, intended for distribution to high-ranking state, military, and party officials starkly defined the problem facing Germany. From 1929 to 1932, only 25 percent of the country’s fuel needs were met by domestic production, with the remainder dependent upon supplies from abroad. If, as seemed reasonable, German fuel consumption were to rise by about 50 percent by 1937, “the proportion [of those needs met by] German production would decrease substantially.”¹⁰³ The Upper Rhine group’s representatives came to the forceful,

¹⁰⁰ Direktionssitzung in Ludwigshafen am Rhein am 21. Juni 1933, p. 2, in BASF UA C13, *Direktionssitzungen Ludwigshafen 1933–1939*.

¹⁰¹ Hayes, *Industry and Ideology*, p. 104.

¹⁰² Hayes, *Industry and Ideology*, pp. 115–17; E.R. Fischer (IG Farben, Abteilung Oel, Berlin) to Dr. Krauch, Ludwigshafen, August 14, 1933, (Abschrift) and attached “Bericht über eine Besprechung mit Herrn von La Roche am 12.8.33 vormittags,” BASF IG, M 02/1.

¹⁰³ “Die deutsche Treibstoffwirtschaft,” June 1933, pp. 2, 18, quotation p. 18, BASF IG, M 02/1.

although not surprising, conclusion that the only solution to the problem was to bring the process they had developed up to industrial scale: “Hydrogenation of lignite and bituminous coal constitutes a practically unlimited means by which to manufacture . . . motor fuels . . . as desired.”¹⁰⁴

Although the solution seemed clear enough, the paper’s authors admitted that there was one key difficulty in pursuing this path: the need for prohibitively high levels of investment. They went on to argue that petroleum market instability (especially during the Depression) made the risks associated with such investment unsustainable for private industry without some form of assistance. The required expansion of hydrogenation would therefore require a guaranteed minimum price and would have to be underwritten by the German state. On the basis of this minimum price, the paper concluded, investment could flow, which would, in turn, lead to steady supply. And, not incidentally, given the still high levels of unemployment, the policy would bring about a significant expansion of the labor market.¹⁰⁵ The case was put strongly and seemed to correspond to National Socialist aims. But the IG leadership still faced an uphill battle, especially because there were powerful voices within the party who favored an alternative solution to the problem of how best to guarantee Germany’s fuel needs.

The most prominent alternative to the IG’s proposal stemmed from the pen of Gottfried Feder, at that time the senior National Socialist economic theoretician and an undersecretary in the Reich Ministry of Economics. Feder was the most strident advocate of an ambitious plan to take advantage of low international oil prices to achieve the government’s aims. What he proposed was a considerable increase in German capacity for refining petroleum imported from abroad. It would, he argued, be substantially cheaper for the government than underwriting the Leuna process. And it would also husband foreign exchange and allow stockpiling of this strategic raw material. In mid-1933, Feder managed to gain the support of Hitler for his plan, which clearly was antithetical to the interests of IG Farben. And, although he was backing away from it to some degree by the summer of 1933, he continued through the summer of 1934 to promote closely related plans by forcing co-operation between the three major enterprises importing oil into Germany – Shell, Esso, and Anglo-Persian Oil Company (which eventually became BP). He also encouraged the construction of a sizeable refinery at Hamburg by a London-based, American-owned firm.¹⁰⁶

¹⁰⁴ “Die deutsche Treibstoffwirtschaft,” June 1933, pp. 18–19, quotation p. 19, BASF IG, M 02/1.

¹⁰⁵ “Die deutsche Treibstoffwirtschaft,” June 1933, p. 16, BASF IG, M 02/1.

¹⁰⁶ Dr. Krauss to F. G. C. Morris, “Meeting in the Reich Ministry of Economy on July 12, 1934,” July 13, 1934; and F. G. C. Morris, “Germany,” July 16, 1934, both in BP, ARC 72179; Hayes, *Industry and Ideology*, p. 115. Material on the Eurotank refinery in Hamburg and the ownership of it is in “Eurotank Refinery, Hamburg,” n.d. (ca. August 1948), BP ARC 55837; “Europäische Tanklager- und Transport A. G. Hamburg,” August 1948, BP ARC

By summer 1933, however, Feder was already backpedaling from his previous position owing to pressure from German industry, most notably IG Farben.¹⁰⁷ Feder's change of heart, which had taken place by August 1933, set the stage for the completion of a "gasoline contract" (*Benzinvertrag*) between the German state and IG Farben, which was signed in December of the same year. In exchange for the trust's promise to raise production at the Leuna works to 300,000–350,000 tons per year by 1935, the government agreed, starting in mid-1934, to purchase that part of the factory's output that could not be sold on the open market. Moreover, for the decade that followed, the government guaranteed for all of Leuna's production a price that would cover all production costs (including taxes and depreciation) plus a 5 percent return on its invested capital. Any profits beyond that 5 percent return on investment, however, would accrue to the government.

This agreement effectively halted the hemorrhaging of IG funds into the Leuna plant, and ensured that the trust's substantial investment would be recouped in the long term. The government, on the other hand, attained its goal of increasing domestic German fuel supplies at very little cost. In fact, the profits from Leuna sales eventually resulted in significant income for the government. It is thus not surprising that the historian of IG Farben, Peter Hayes, has concluded that the agreement "astutely balanced the interests of the contracting parties."¹⁰⁸ Contract in hand, the IG could begin work immediately on the expansion of Leuna's hydrogenation facilities, with a group from Ludwigshafen's engineering office (*Konstruktionsbüro*) led by Kurt Berger charged with designing the new facilities. Construction was carried out by a group sent east from Ludwigshafen's structural design office (*Baukonstruktionsbüro*).

Even as the German government extended promises that would finally lead to break even – and even profit – for the IG from Leuna's gasoline production, moves were underway to underpin that profitability still further through sales of licenses and know-how to other firms that were about to apply hydrogenation processes. The conclusion of the gasoline contract with the Reich made this prospect especially attractive since license fees and royalties from production outside the Leuna plant were not covered by the agreement and were therefore not subject to the profit ceiling of 5 percent.

Again, the impetus behind these developments was the National Socialist pursuit of economic self-sufficiency. Already in August 1933, the head of

55016. The story is investigated in closer detail in Karlsch and Stokes, *Faktor Öl*, especially pp. 168–9, 252–3, 263–5.

¹⁰⁷ "Bericht über eine Besprechung mit Herrn von La Roche am 12.8.33 vormittags," p. 1, BASF IG, M 02/1, "Eurotank Refinery, Hamburg," n.d. (ca. August 1948), BP ARC 55837; "Europäische Tanklager- und Transport A. G. Hamburg," August 1948, BP ARC 55016.

¹⁰⁸ "Benzin-Vertrag," December 14, 1933, NI-881, IWM, London; Hayes, *Industry and Ideology*, pp. 117–19, quotation p. 118.

the supervisory board of the Hibernia Mining Company, which was owned by the Prussian state, had indicated in a meeting with Gottfried Feder that his company was in the process of negotiating a contract with the IG to build a bituminous coal hydrogenation facility with a capacity of at least 100,000 tons per year. Unlike most other Ruhr coal producers, Hibernia was not directly attached to a steel plant and therefore did not have a steady market for its coal. It needed to diversify, and hydrogenation in the context of National Socialist autarky policies seemed to provide an answer. For IG Farben's part, a meeting of the top management and technical personnel from *Sparte I* in September 1933 had identified bituminous coal liquefaction as a promising line of development that would allow the trust to achieve synergies at the intersection of the chemical and the petroleum industries. After all, the traditional petroleum industry had neither an interest in nor the technology for extracting and exploiting the rich variety of aromatic compounds that were a by-product of bituminous coal hydrogenation and that were especially interesting for dye and pharmaceuticals production. For its part, brown coal (lignite) hydrogenation, such as that at Leuna, did not yield much in the way of aromatics either. Bituminous coal was different, however. Not only would it be possible to produce motor fuels; "the products of bituminous coal hydrogenation are, by virtue of their structure, more suited to the manufacture of pure materials – especially aromatics – than lignite, since bituminous coal has a basic aromatic character."¹⁰⁹

Unlike lignite, however, bituminous coal had not yet been used in the hydrogenation process on an industrial scale by the early 1930s. One of the difficulties that dogged such efforts involved the handling of catalysts during the gas phase of the hydrogenation process so as to produce yields of gasoline as well as the other products. This complication was undoubtedly part of the reason that bituminous coal producers put their interest in the process on the back burner during 1934. In the meantime, Matthias Pier continued development work in this area in his high-pressure experimental laboratory at Ludwigshafen, pursuing lines of experimental work that he had begun between 1929 and 1931. Pier's breakthrough came in 1934 and 1935, when he was able to produce technical documentation for a full-scale plant in conjunction with the successful operation of a large pilot plant in his lab. In July 1935, Hibernia therefore came to an agreement with IG Farben to exploit the technology in the coal producer's Scholven Hydrogenation Works.¹¹⁰

¹⁰⁹ "Bericht über eine Besprechung mit Herrn von La Roche am 12.8.33 vormittags," p. 2, BASF IG, M 02/1; Hochdruckversuche Lu, "Die Hydrierung von Steinkohle und von Steinkohle-Produkten in ihrer Bedeutung für die chemische Industrie," January 16, 1934, BASF UA, Pier Akten 47.

¹¹⁰ Hochdruckversuche Lu, "Die Hydrierung von Steinkohle und von Steinkohle-Produkten in ihrer Bedeutung für die chemische Industrie," January 16, 1934, BASF UA, Pier Akten 47;

The contract with Hibernia provided the Upper Rhine group with an excellent opportunity for lucrative exploitation of its technological capabilities without the attendant risk and ruinous investment associated with owning and operating additional hydrogenation plants. The Ludwigshafen-based design and engineering offices drew up the plans for the Scholven plant and directed its construction, in exchange for which they received a lump-sum payment of RM 500,000 plus processing fees of 3 percent of the value of all materials and machinery ordered in connection with the plant. The Upper Rhine group also provided the catalysts required at Scholven at cost plus 10 percent profit. And there were royalties to be paid, which, based on projected capacity of 125,000 tons per year, would amount to additional income of RM 625,000 per annum. Pier himself would have preferred that the IG construct a plant of its own in Ludwigshafen, near his lab, a plea he repeated forcefully and often well into the war, although with little effect.¹¹¹

In late September 1934, even before the Hibernia agreement was sealed, another and even greater expansion of hydrogenation capacity began when the Nazi government, as part of its effort to attain autarky, simply promulgated a decree forcing lignite producers to establish Braunkohle-Benzin AG, or BRABAG. The compulsory joint venture was consequently set up in late October. BRABAG's membership comprised the ten largest lignite producers, which included the IG.¹¹²

The formal meeting to establish BRABAG took place in Berlin at the end of October 1934. It was agreed that each of the members would contribute to the new corporation's capital in proportion to its relative output of lignite. Although most of the founding companies were represented on BRABAG's supervisory board, only one company, IG Farben, was represented on the

Hochdruckversuche Lu, "Kurzes Referat des Vortrages von Dr. M. Pier auf der TEA-Sitzung in Frankfurt a.M. am 28. Oktober 1942," November 9, 1942, BASF UA, Pier Akten 44; Hochdruckversuche Lu, "Zeitliche Entwicklung des IG Hydrierverfahrens 1933 bis 1938," October 18, 1942, BASF UA, Pier Akten 47; Kemmer, *Oel-Spuren*, pp. 14, 16.

¹¹¹ Kemmer, *Oel-Spuren*, p. 18; Mach, *Entwerfen und Bauen*, p. 107; Hochdruckversuche Lu, "Die Hydrierung von Steinkohle und von Steinkohle-Produkten in ihrer Bedeutung für die chemische Industrie," January 16, 1934, p. 3, BASF UA, Pier Akten 47; Hochdruckversuche Lu, "Kurzes Referat des Vortrages von Dr. M. Pier auf der TEA-Sitzung in Frankfurt a.M. am 28. Oktober 1942," November 9, 1942, pp. 2–3, BASF UA, Pier Akten 44. Pier's proposals seem to have been taken quite seriously even in 1934, when the head of the IG's Oele Abteilung, E.R. Fischer, suggested in a memo that reconfiguration of nitrogen plants at Oppau to hydrogenation was planned and would lead to a capacity of 80,000 tons of gasoline per year. E.R. Fischer to Leuna-Werke, Direktion, "Der gegenwärtige Stand der deutschen Treibstoffversorgung und die Ausbaumöglichkeiten der inländischen Produktion," and attachment, September 13, 1934 (p. 8 of attachment), BASF IG, M02/1.

¹¹² Heinrich Bütefisch, "Gründung der Braunkohlenbenzin AG und ihre Beziehungen zur IG," pp. 7–12 of "Bericht über die 1. Oelbesprechung in Ludwigshafen am 10. Januar 1935," BASF UA, Pier Akten 43. The beginning of the "oil discussions" in early 1935 speaks volumes about the renewed growth and growth potential of the technology as viewed by the management of the Upper Rhine group.

managing board. Thus, the Upper Rhine group's Carl Krauch took his seat in that body alongside three other gentlemen, who represented the military, a company closely tied to the military, and the National Socialist Party, respectively¹¹³

At the founding meeting of BRABAG, the members also agreed to establish three hydrogenation facilities in central Germany, one in Böhlen (near Leipzig), one near Magdeburg, and one in the Niederlausitz area. Construction on the first two began in 1935, and they came onstream in 1936, each with an initial annual capacity of 150,000 tons of gasoline, which was to rise to about 250,000 tons per year each during the war. Groundbreaking for the third facility, sited at Zeitz, occurred in 1937, and the factory was completed in early 1939. At about 280,000 tons per year, its capacity was considerably higher than the initial rated output of the others.¹¹⁴

Obviously, IG Farben's participation in the compulsory corporation and the placement of one of its most important executives on the managing board of directors gave it a deep and abiding interest in BRABAG's affairs. But what was far more important for the trust, and for the plants of the Upper Rhine group in particular, was the fact that BRABAG, like Scholven, would provide lucrative design, construction, and licensing contracts.

For, although there were competing processes, BRABAG's members agreed unanimously "that at present only one process for producing motor fuels comes into question, namely, the IG process. Plants should in the first instance be designed to use this process." The members therefore ordered that negotiations between BRABAG and the IG proceed immediately regarding the precise conditions of the license. In the months that followed, BRABAG set up central offices in Berlin. But, significantly, the engineering division was to be set up in Leuna "in order to guarantee the quickest possible completion of work," and the IG also contributed one of the joint heads of this engineering office, Wilhelm Simmat, who worked together with a Mr. Ernst from the Central German Steel Works. In compensation for these significant levels of involvement in technical work, design, and construction supervision, the IG would receive a substantial lump-sum payment. For example, in the first year alone the fees the IG received for the first facility, Böhlen, amounted to over RM 1 million. The concern used part of these fees to support the work of Matthias Pier and his staff in the high-pressure experimental laboratory in Ludwigshafen, and this investment paid off quickly and well. One of the

¹¹³ Heinrich Bütefisch, "Gründung der Braunkohlenbenzin AG und ihre Beziehungen zur IG," in "Bericht über die 1. Oelbesprechung in Ludwigshafen am 10. Januar 1935," p. 9, BASF UA, Pier Akten 43; Hayes, *Industry and Ideology*, p. 135.

¹¹⁴ Heinrich Bütefisch, "Gründung der Braunkohlenbenzin AG und ihre Beziehungen zur IG," in "Bericht über die 1. Oelbesprechung in Ludwigshafen am 10. Januar 1935," pp. 10–11, BASF UA, Pier Akten 43; Stranges, "Germany's synthetic fuel industry, 1927–1945," Tables 1 and 2.

first breakthroughs came in November 1936 when Pier came up with an alternative catalyst system for the Böhlen and Magdeburg plants, improving the octane rating of the gasoline manufactured there from 59 to 65.¹¹⁵

Eventually, the IG's Simmat took over sole leadership of the BRABAG engineering and construction office at Leuna, which was now renamed Mineralölbau-Gesellschaft mbH and which received funds directly from the Reich to support its activities. The IG subsidiary was staffed for the most part with engineers and technicians from Leuna, Ludwigshafen, and Oppau, and it carried out contracting work for the expansion of the synthetic oil – and eventually the synthetic rubber – industry in the Third Reich. The engineering office located at the Upper Rhine group's core factory at Ludwigshafen was responsible for the design work on these and other hydrogenation plants built during the Nazi years.¹¹⁶

All in all, then, during the initial years of the National Socialist government, *Sparte I* and the Upper Rhine group combined their proven technical expertise with well-cultivated political connections to transform a product line faced with disastrous losses into one that verged on profitability. As early as March 1935, Leuna's Heinrich Bütefisch, a man from the BASF stable who was responsible for synthetic fuels development at the IG, could point with pride to the impressive number of projects well in hand. And he was able to reassure the trust's TEA of "justified optimism about favorable further development."¹¹⁷

Even as Bütefisch spoke, however, the Upper Rhine group was also on the brink of significant breakthroughs in another promising synthesis technology, that for producing synthetic rubber, or buna. Unlike the case of synthetic fuel, though, the group was not alone within the IG in the technological development of buna. Nor did the division dominated by its personnel, *Sparte I*, control synthetic rubber technology and production. Instead, responsibility for its development was in the hands of the Lower Rhine group's Fritz ter Meer, the head of *Sparte II*.

Still, although all of the IG Farben component firms had long been interested in developing synthetic rubber, the Upper Rhine group was one of those at the forefront. By the eve of World War I, in parallel with Bayer's Elberfeld works, Ludwigshafen had already undertaken a considerable amount of

¹¹⁵ Heinrich Bütefisch, "Gründung der Braunkohlenbenzin AG und ihre Beziehungen zur IG," in "Bericht über die 1. Oelbesprechung in Ludwigshafen am 10. Januar 1935," pp. 11–12, BASF UA, Pier Akten 43; Hayes, *Industry and Ideology*, p. 135; Stranges, "Germany's synthetic fuel industry," pp. 192–3, 197–8. On the development of Böhlen, see Chapter 1 of Karlsch and Stokes, *Die Chemie muss stimmen*.

¹¹⁶ Mach, *Entwerfen und Bauen*, pp. 106–8; "Von der BASF in Deutschland und im Ausland gebaute Anlagen," n.d. [ca. 1962], p. 7, BASF IG, R 01/1.

¹¹⁷ Heinrich Bütefisch, "Hydrierung," presentation summarized on pp. 2–5 of "Niederschrift über die Sitzung des TEA am... 8. März 1935," quotation p. 5, BASF UA, D581, TEA Protokolle V.

work on synthesizing rubber, having registered a number of patents between 1909 and 1913, when rubber prices fell from RM 28 to 10 per kilogram and rendered the program unprofitable. Bayer produced a great deal of synthetic rubber during World War I, but the technology was largely abandoned again for the same reason after the war.

When IG Farben's rubber commission nevertheless decided in late October 1926 to revisit this line of inquiry, it was in no small measure owing to the work that was being done in Ludwigshafen-Oppau and other IG factories. However, when world market prices fell from RM 6.50 per kilo in 1925 to RM 2 per kilo in 1928, development work was scaled down considerably once more, although it was sufficiently advanced to permit production of technical plans for a large pilot plant in Knapsack, near Cologne, which could be implemented at any time.¹¹⁸

During 1931, the leader of the newly formed *Sparte II*, ter Meer, who was responsible for setting company policy on synthetic rubber, saw the price of natural rubber slip by an additional 80 percent. Not wanting to repeat the fiasco that had occurred with synthetic gasoline, ter Meer ordered a further scaling back of investment and interest in buna. The Nazi seizure of power, however, opened up new possibilities.¹¹⁹

Still cautious, ter Meer authorized two members of the Upper Rhine group to write to the Army Weapons Office (*Heereswaffenamt*) in mid-August 1933 to seek government assurances on two issues before he would commit his division to more rapid development work. The letter requested that the military agree to purchase tires made from synthetic rubber for testing on their vehicles, suggesting that the number tested not be less than 1,000. The two sides eventually came to an agreement on this issue by November 1933. It proved harder to convince the government to try to persuade tire manufacturers to use buna (existing versions of which much more difficult to process than natural rubber) in their production plants.¹²⁰ Thus, ter Meer continued his wait-and-see policy, although he made available some additional funds for development work. Between 1933 and 1936, again largely at Ludwigshafen and Oppau, chemists working with styrene and acrylonitrile developed prototypes of mixed synthetic rubber whose oil resistance and other properties enabled it to replace natural rubber in certain applications.¹²¹

¹¹⁸ Dr. Claus Heuck, L. K. Abt. Ludwigshafen, "Entwicklung der Herstellung von künstlichem Kautschuk," May 7, 1936, pp. 1–5 in BASF UA, F 9/152; Morris, "Development of Acetylene Chemistry and Synthetic Rubber," p. 160–1, 170–3.

¹¹⁹ On this paragraph and the following one, see Hayes, *Industry and Ideology*, pp. 114–15; Morris, "Development of Acetylene Chemistry and Synthetic Rubber," pp. 170–3, 252–3.

¹²⁰ IG Farbenindustrie AG, Stickstoffabteilung (Fahrenhorst and Wild) to Heereswaffenamt, August 15, 1933, Bundesarchiv Berlin-Lichterfelde R8128/A1153; Erker, "Rolle der Forschung."

¹²¹ Dr. Claus Heuck, L. K. Abt. Ludwigshafen, "Entwicklung der Herstellung von künstlichem Kautschuk," pp. 5–6 in BASF UA, F 9/152.

By autumn 1935, the promising development work of the past few years reached the stage at which it was possible, with encouragement from the government, to begin construction of a large pilot plant for producing 2,400 tons of buna per year at Schkopau, not far from the Leuna works. The Schkopau plant was so designed as to facilitate an expansion of capacity up to 30,000 tons per year if the pilot plant were successful.¹²² As had been the case with synthetic petroleum, BASF-related plants and personnel took the lead in establishing the new factory, with Ludwigshafen's design and construction offices playing a major role in its erection. The new plant came directly under the organizational control of the Leuna works.¹²³

During the initial period of Nazi rule in Germany between 1933 and 1936, the part played by the Upper Rhine group and IG Farben thus gradually shifted. They moved from a relatively low-key position of exerting influence over government policies in order to prop up flagging production lines to a role in which the group and the concern participated more and more actively in shaping and implementing National Socialist programs aimed at economic self-sufficiency for Germany. Given National Socialism's long-term objectives and the widespread public support for action to re-establish German power and prestige internationally through repudiating the provisions of the hated Treaty of Versailles, this change had significant ramifications. The journey from policies fostering economic autarky to those designed to achieve strategic autarky involved only small steps – often, it is likely, without full awareness that a step had even been made. From there it was only a short stride to the promotion of active preparation for war.

Although historians generally date this transition as occurring in 1936 with the establishment of the Four Year Plan Organization under Hermann Göring, planning for strategic autarky was well underway by 1935. In the autumn of that year active preliminary planning for “the case of mobilization” (*Mob-Fall*) began as well. At IG Farben, Carl Krauch, who was emerging as the concern's point man in autarky-related projects (as evidenced, for instance, by his seat on the managing board of BRABAG) and its most important and influential liaison with government, created the Army Liaison Office (*Vermittlungsstelle W[ehrmacht]*) in September 1935.¹²⁴

There is evidence to suggest, however, that the IG took its initial steps in this direction much earlier. After all, Krauch noted in his September 1935 memorandum that “the preparations for *Sparte I* have been started some

¹²² Fritz ter Meer, *Die IG Farbenindustrie AG*, pp. 90–1.

¹²³ Karlsch and Stokes, *Die Chemie muss stimmen*, Chapter 1.

¹²⁴ Hayes, *Industry and Ideology*, pp. 141–2; Krauch and Fahrenhorst to various “leaders of the enterprise” in Sparte I, “Betr.: Wehrwirtschaft. Zentralstelle der IG für alle wehrwirtschaftlichen Dinge und wehrpolitischen Fragen,” September 5, 1935, GARF, Moscow, 1457-49-2.

time ago by Dr. Ritter.”¹²⁵ And Ernst Struss, the head of the influential IG TEA Office, claimed in the immediate aftermath of the war that Krauch began setting up a mobilization office in 1934, “perhaps even at the end of 1933.” Supporting this view, a document written shortly after Krauch’s memo in September 1935 indicated that a similar proposal for a liaison office with the armed forces had been floated in 1934.¹²⁶ It therefore appears clear that top IG personnel divined very early on that war was likely in the near future.

In any case, however, the formal establishment of the IG Army Liaison Office was in autumn 1935, and it was intended to allow the concern to gain control of the rapidly changing situation with regard to autarky and rearmament. Its leaders meant it to accomplish a number of goals. For one thing, the IG hoped its early independent action would fend off potential attempts by the government and military to take over sole responsibility for planning and investment. It also hoped to use information gathered by the Liaison Office to support its case for a “balanced” approach to rearmament, one which would “optimize” construction of additional productive capacity so as to meet the needs of the military and simultaneously preserve the trust’s commercial interests. Finally, the establishment of the Liaison Office marked an attempt by Krauch to ensure coordination and monitoring of all contacts between military offices and IG Farben officials. This task proved daunting. Accordingly, the payroll of the IG’s central Army Liaison Office grew substantially. Initially, the Office was quite small, employing just six people drawn from the Oppau works, where Krauch had spent his earlier career. But by the time the war broke out, it had 6 to 8 professional personnel and 30 to 40 office workers.¹²⁷

Clearly the Liaison Office’s heyday lay in the period covered in section 5. But already in 1935 it had an impact on the IG, for representatives from each of the concern’s main works, including those of the Upper Rhine group, were designated as liaison officers with the central Office staff. The officers’

¹²⁵ Krauch and Fahrenhorst to various “leaders of the enterprise” in Sparte I, “Betr.: Wehrwirtschaft. Zentralstelle der IG für alle wehrwirtschaftlichen Dinge und wehrpolitischen Fragen,” September 5, 1935, GARF, Moscow, 1457-49-2.

¹²⁶ Ernst Struss, “Vermittlungsstelle W, Berlin,” September 24, 1945, BASF IG, C 10/2. [This file is a photocopy of Akte 201: Vorstand IG aus Nachlass Struss, original in Archiv Farbwerke Hoechst.] Schiller, “Notiz betr. Vermittlungsstelle W,” September 18, 1935, BAL R 8128/A 1153.

¹²⁷ Krauch and Fahrenhorst to various “leaders of the enterprise” in Sparte I, “Betr.: Wehrwirtschaft. Zentralstelle der IG für alle wehrwirtschaftlichen Dinge und wehrpolitischen Fragen,” September 5, 1935, GARF, Moscow, 1457-49-2. Note that since this memo was directed to Sparte I members only, Ludwigshafen was not included. Ernst Struss, “Vermittlungsstelle W (Wehrmacht),” June 20, 1945, BASF UA C 10/2: IG AG, Geschäftsführung, Leitung IG 1925–1945. [This file is a photocopy of Akte 201: Vorstand IG aus Nachlass Struss, original in Archiv Farbwerke Hoechst.] See also Hayes, *Industry and Ideology*, pp. 142–3.

main job was to produce for their works a “Mob-Kalender,” or planning document for the case of mobilization. It included two parts, one technical and one more general. Both were concerned with the precise identification of the capacity of factories for producing specific lines, with the stockpiling and supply and with access to supplies of energy. The general, or main, part also included attention to such issues as transportation, personnel availability, air-raid protection measures, and financial planning.¹²⁸

Recovery in Production and Trends in R&D

In the first years of the National Socialist government, overall revenue for the IG trust soared. Sales rose steadily from RM 871 million in 1932, breaking the 1 billion RM barrier in 1935 for the first time since 1931. In the following year, with the country’s full commitment to autarky and war preparation, sales revenue went up even more sharply, to RM 1.3 billion. Levels remained slightly below those attained in both 1928 and 1929, but the clear trend was sharply upward.¹²⁹

Turnover at the Rhine-based factories of the Upper Rhine group grew in tandem with that of the trust as a whole, although its recovery from the nadir in 1932 was much more striking. Sales nearly doubled between 1932 and 1936, from RM 227.5 to 425 million, although the increase from 1935 to 1936 was especially impressive.¹³⁰ Investment in new plant in the factories of the Upper Rhine group grew dramatically with the general recovery after the National Socialist seizure of power. Again the *Sparte I* factories, led by Oppau and Leuna, were the primary beneficiaries.¹³¹ But the group’s core factory in Ludwigshafen also experienced considerable investment in modernization and renovation from 1932 to 1936.¹³²

As one would expect, the overall increases in sales and investment within the Upper Rhine group were paralleled by generally upward movement in production and sales of individual product lines, although this relation varied somewhat. As a result of the market and price guarantees agreed in the gasoline contract and the related decision to increase capacity at Leuna,

¹²⁸ A blank copy of the Kalender is in IG Farbenindustrie Aktiengesellschaft, “Mob-Kalender für das Werk,” November 10, 1936, in GArF, Moscow, 1457-49-4.

¹²⁹ Ter Meer, *Die IG Farbenindustrie*, table: “IG-Gesamt-Umsätze”; Gross, *Material zur Aufteilung der IG Farbenindustrie AG*, Table IIa.

¹³⁰ Dr. H. Rötger, “Umsatzanteil pro Belegschaftsmitglied,” Table 1, n.d. (ca. 1965–6), BASF IG, T 01.

¹³¹ TEA-Büro, “Ausgaben für Neuanlagen Hauptgruppen 1–3 ab 1932,” December 13, 1940, BASF IG, C 30/2.

¹³² Seidel, “Entwicklung des Werkes Ludwigshafen in den letzten 3 Jahren,” pp. 5–6 of “Niederschrift über die Sitzung des TEA am... 3. September 1935,” quotation p. 6, BASF UA, D581, TEA Protokolle V.

production of synthetic gasoline surged. By 1935, Leuna was churning out its full complement as promised in the gasoline contract, 332,153 tons, and in 1936 it did even better, manufacturing over 375,000 tons. Significantly, in June 1935, members of the TEA Office learned that a portion of Leuna's production would henceforth be devoted to airplane fuel, so the factory's modest output of 391 tons of aviation spirit in 1935 shot up to nearly 66,000 in 1936. A related decision was made to build a plant to produce the antiknock compound tetraethyl lead at Leuna, although this facility was subsequently built elsewhere.¹³³ By 1935 Leuna, too, was using lignite for about half of its total synthetic fuels output, having overcome earlier problems with the feedstock that had necessitated deployment of brown-coal (lignite) tar.¹³⁴

Such dramatic production increases in synthetic gasoline played an important role in permitting the massive factory to operate at full capacity for the first time. Together with process improvements, this utilization led to decreasing costs. Between 1932 and 1935, the cost of manufacturing a ton of synthetic product dropped steadily, and by 1936 it had reached the target of RM 200 set earlier in the decade. As costs went down and output increased, hydrogenation began to pay off, if only modestly, for the first time in its history. In 1935 Leuna's synthetic gasoline program went into the black for the first time, posting a total profit of more than RM 5 million in the two years 1935–6.¹³⁵

The Upper Rhine group's other mainstay, nitrogen, also recovered during the initial National Socialist period, although with some delay. IG sales of nitrogen, most of which was produced by the Upper Rhine group factories at Oppau and Leuna, actually sagged somewhat in 1932 and 1933, an unusual result for most of the trust's product lines. And the increase in sales revenue from 1933 to 1934 was under 2 percent. Thereafter, however, in tandem with National Socialist agricultural policies, recovery proceeded apace, with the overall increase in sales revenue between 1933 and 1936 amounting to fully 32 percent. Still, at RM 22.4 million even in 1936, revenues from this source were still far less than half what they had been in their heyday in 1928. As a percentage of total sales by the IG, nitrogen continued its overall decline, albeit more slowly, dropping from just over 18 percent in 1933 to about 16 percent of revenue in 1936. It was a far cry from the 42.4 percent of IG

¹³³ "Produktion und Gestehskosten Leuna," June 27, 1947, BASF UA, Pier Akten 49; Montagsbesprechung beim Teabüro am 24.6.1935, BASF IG, C 30/1; Montagsbesprechung beim Teabüro am 9.12.1935, BASF IG, C 30/1.

¹³⁴ Heinrich Bütfisch, "Hydrierung," presentation summarized in "Niederschrift über die Sitzung des TEA am... 8. März 1935," p. 4, BASF UA, D 581, TEA Protokolle V.

¹³⁵ Heinrich Bütfisch, "Stickstoff und Hydrierung," p. 2 of "Niederschrift über die Sitzung des TEA am... 22. April 1936," BASF UA D 583; "Produktion und Gestehskosten Leuna," June 27, 1947, BASF UA, Pier Akten 49; "Kosten der Hydrierung," June 30, 1947, BASF UA, Pier Akten 49.

sales income generated by nitrogen at the beginning of the trust's existence in 1926, but at least the decline seemed to have slowed.¹³⁶

Developments in these two key product lines reinforced existing differences between the Upper Rhine group's two factories that belonged to *Sparte I*, and the main plant at Ludwigshafen, which was attached to *Sparte II*. Not only was the Ludwigshafen facility a more traditional and varied production unit than Oppau or Leuna, it also was far more oriented to export than its sister plants. The latter tendency in particular was intensified during the Nazi period, when the government aimed to stimulate the domestic orientation of production generally, a policy that affected *Sparte I* disproportionately. A report prepared for the Reich War Ministry in mid-1936, based on recently gathered data, indicated that the export share of the total sales value in *Sparte I* was just 13 percent, and this solely in the areas of nitrogen fertilizer and technical nitrogen. In contrast, exports accounted for 50 percent of *Sparte II*'s total sales, and the Ludwigshafen factory, like the main factories in Hoechst and Leverkusen, earned about 60 percent of its revenue through export.¹³⁷ Nevertheless, some key products manufactured at or developed by the lead Upper Rhine group factory would prove essential to autarky policy and war preparations. It is also fair to say that, without Ludwigshafen's R&D efforts and its design and construction departments, the pell-mell expansion of the synthetic fuel and, later, synthetic rubber industries in Germany could not have occurred.

As was the case with the other Upper Rhine group factories, production and sales at Ludwigshafen recovered in virtually all areas in the years between 1932 and 1936. Some production increases were very impressive indeed, and even the most traditional areas experienced buoyant revenues for the first time since the late 1920s. Dye and dyestuffs intermediates sales from Ludwigshafen in the BASF group went up by 7 percent between 1932 and 1934, and the increase was 11 percent overall between 1932 and 1936. Despite this improvement, the BASF group's share in the IG's overall dyestuffs-related sales fell from over 60 percent to 47 percent. This decline occurred even as the contribution of dyes and dyestuffs intermediates sales to the trust's overall revenue shrank from 36 percent to 27 percent.¹³⁸

The recovery in the Upper Rhine group's range of chemical products, much of which was manufactured at Ludwigshafen, was even more convincing, with group sales in this area increasing a startling 163 percent between 1932

¹³⁶ Marsch, "Strategies for Success," p. 68. Percentage increases are calculated on the basis of the figures in Marsch's article by the current author.

¹³⁷ IG Farbenindustrie AG, Vermittlungsstelle W (Brüning) to Reichskriegsministerium z.Hd. v. Herrn Ministerrat Godlewski, July 7, 1936, GARF, Moscow, 1457-49-2.

¹³⁸ Dr. Rötger, "Anteil des Farbstoffgeschäfts am Gesamtumsatz IG und BASF," Table 13, February 24, 1967, BASF IG, T 01/1. Year-on-year percentage increases are calculated by the current author on the basis of figures provided in this table.

and 1936. The group's contribution to overall IG sales in chemicals also increased during the same period from 11 to nearly 13 percent. Naturally, some product lines outperformed others. Traditional lines produced by the BASF group, such as solvents on the one hand and acids and acid by-products on the other, were among the "laggards" compared to overall group gains despite a healthy increase in sales of 125 and 87 percent, respectively, between 1932 and 1936. Even more modest increases occurred in other traditional areas, including organic acids and salts (29 percent) and organic tannins (14 percent). Chrome products and inorganic tannins, however, were the only area in which sales declined during the period, this by 42 percent.

Other product lines, some of them also traditional, showed above-average increases between 1932 and 1936. The group's revenues from organic intermediates sales, for instance, went up by 255 percent, and those in the area of vulcanization products went up by 218 percent. However, the group's most spectacular sales increases occurred in new or relatively new areas – especially those connected to autarky and, eventually, rearmament. The category of plastics had been virtually nonexistent in the group's production palette before 1934, although the Upper Rhine group did manufacture artificial resins, which were the forerunners of modern plastics. Using the sales of artificial resins in 1932 as the baseline against which to measure combined sales of resins and plastics in 1936, the increase was an astonishing 1,378 percent. What is more, rises in revenue from this area accounted for over 15 percent of the total increase in sales of chemicals by the group between 1932 and 1936. But there were also other areas of rapid growth for the group. Sales of metals and alloys produced by its core factories, for instance, went up even more spectacularly, by 1,459 percent, accounting for nearly a third of overall group sales increases between 1932 and 1936. Together, just four product lines – acids and by-products; organic intermediates; metals and alloys; and resins and plastics – accounted for three-quarters of the increases in sales revenue from chemicals by the BASF group between 1932 and 1936.¹³⁹

Such figures indicate significant changes in the product palette at Ludwigshafen between 1932 and 1936. As mentioned, one product category experiencing particularly dramatic increases in sales and production at Ludwigshafen was plastics, for between the early 1930s and 1935 the Upper Rhine group was able to translate a number of promising R&D efforts into full-fledged commercial products. For instance, processes for making styrene and polystyrene were brought up to industrial scale. The same held true for a continuous process for manufacturing polyethylene whose trade name, Lupolen, echoed its origins in the Upper Rhine group's parent plant.

¹³⁹ Dr. Rötger, "Chemikalien-Umsätze der IG und der BASF," Tables 3a and 3b, May 27, 1966 and September 23, 1969, BASF IG, T 01/1. Increase over time and percentages of overall sales increases are calculated by the current author on the basis of figures presented in this document.

Moreover, polyamides and acrylics were brought on-line. Common to all of them was the fact that they built not just upon the strengths of the group's main factory in R&D but also on its experience and technical aptitude, especially in areas such as polymerization and the use of catalysts. Initially, the quantities produced were fairly small, and sales were aimed at specialist markets, as was true for polyethylene's application as specialized insulation for high-end electrical apparatus. But, even in such relatively small quantities, their production was to prove essential for the German war effort, and the experience gained in making them would also prove vital to BASF's postwar recovery and resurgence.¹⁴⁰

In the short term, another new line, magnetic tape, was much less important than plastics manufacture for the Upper Rhine group, amounting to a fraction of total group chemical sales.¹⁴¹ But it is important to mention for two reasons. First, it was a completely new and very promising product line in 1935–6, one that made excellent use of Ludwigshafen's technical experience and capabilities. Second, production of it grew tenfold between 1936 and 1942, not least because of burgeoning demand from the military and from Josef Goebbels' propaganda ministry.

Ludwigshafen's interest in magnetic tape production resulted from a joint development project with the German electrical manufacturer AEG, which had just announced the development of a magnetic tape machine, the Magnetophon, to compete with other recording machines already on the market (such as the Dictaphone).¹⁴² But the machine itself was not very innovative. Instead, its novelty lay in the way in which it would make recordings, which is where the Upper Rhine group came in. The office of the group director, Gaus, was responsible for the development of a process, together with AEG, for manufacturing an acetylcellulose tape that was coated with carbonyl-iron powder. The preliminary work was kept confidential, with even other IG offices kept in the dark, mainly because of the perceived commercial potential of the product. As a memorandum of the IG Central Financial Administration put it in September 1935, "It is not inconceivable that the apparatus will revolutionize the whole voice-recording sector since the process offers major advantages over previous processes involving gramophone records or cylinders."

The memo listed several advantages of the new recording medium. Not only would the tape be easy to use, the finely ground and magnetized iron compound that served as the recording medium would also make it

¹⁴⁰ Schuster, *Badische Anilin- & Soda-Fabrik AG*, pp. 25–6.

¹⁴¹ Dr. Rötger, "Chemikalien-Umsätze der IG und der BASF," Table 3b, September 23, 1969, BASF IG, T 01/1.

¹⁴² Friedrich Engel and Peter Hammar, "A selected history of magnetic recording," gives a general overview of the development of this technology. I am grateful to Dr. Engel for providing me with a copy of this paper, which is in my possession.

feasible for “a relatively small surface [to carry] much longer sound recordings . . . than hitherto possible with gramophone records.” An additional advantage in comparison to gramophone records was that the tapes could be played back immediately without further processing or manufacture. Internal IG documents also stressed the war potential of the new recording medium.¹⁴³ Accordingly, large-scale production of magnetic recording tape began at Ludwigshafen in 1936, and despite many teething problems, its revolutionary commercial, political, and military potential was soon realized.¹⁴⁴

On the other hand, some product lines were shut down within the group, not always because of flagging sales but often because of overwhelming increases in demand and/or technological change. From 1926 through 1936, for example, Ludwigshafen had considerable success in developing ethylene oxide-related products, including glycol, glycol ethers, and various textile processing agents, in particular as of 1932. By the mid-1930s, pell-mell growth in output led to bottlenecks in supply of ethylene and a search for other and cheaper sources of the starting material. Unlike the United States, which had access to great quantities of ethylene as a by-product of its massive petroleum refining capacity, Germany refined only modest quantities of petroleum, so this source could not solve the problem. The IG therefore decided to deploy a new plant at Zweckel for processing ethylene fractions of coke-oven gas manufacture. Together with the Holten plant, 46 percent of which was owned by the IG, Zweckel would displace the more expensive traditional facilities for ethylene production on the basis of ethyl alcohol spirit at Ludwigshafen and in central Germany, which would be mothballed and held in reserve to meet future needs. But an additional, relatively cheap source for ethylene was the processing of hydrogenation waste gases. And this technical process, developed in Oppau, was deployed in Leuna.¹⁴⁵

The process for deriving ethylene from hydrogenation waste gases is a good example of an important strand in the Upper Rhine group’s R&D activity, especially during the initial period of National Socialist rule in Germany. After all, support of existing product lines through development of new but related processes or products, or alternative catalyst systems, could have a

¹⁴³ Zentral-Finanzverwaltung (Schiller), “Aktennotiz Betr. Magnetophon,” September 4, 1935; AEG, “Magnetophon, das neue Tonaufzeichnungsgerät,” promotional brochure, September 1935; Zentral-Finanzverwaltung (Schiller), “Aktennotiz Betr. Magnetophon,” December 10, 1935, all in GARF, Moscow, 1457-43-3. First quotation from Schiller’s September 2 memo, second from his December 10 memo, which also refers to war potential.

¹⁴⁴ IG Farben’s Schiller pointed out some of the technical, and therefore potentially also commercial, limitations of the early tapes in a letter to IG Director Walter Horstmann, February 5, 1936, GARF, Moscow, 1457-43-3.

¹⁴⁵ Heinrich Bütfisch, “Stickstoff und Hydrierung,” pp. 2–3 of “Niederschrift über die TEA-Sitzung . . . am 22. April 1936”; Otto Ambros, “Entwicklung des Aethylengebietes,” pp. 2–3 of “Niederschrift über die TEA-Sitzung . . . [as above. RS] am 21. Juli 1936”; both documents in BASF UA, D 583.

pronounced impact on the effectiveness and efficiency of a given plant. An additional instance of this link was Pier's work in Ludwigshafen's high-pressure laboratory on catalysts, which substantially improved the octane rating of gasoline produced at the BRABAG plants in Böhlen and Magdeburg.

But R&D within the group did not just support existing lines. It was also characterized by significant extension of the group's strengths in high-pressure and polymer chemistry. The growing importance of plastics, was demonstrated when a new Intermediates and Plastics Laboratory was founded in Ludwigshafen in January 1934. Walter Reppe, whose path-breaking basic research into ethylene, acetylene, and synthetic rubber chemistry had already had a pronounced impact on production and planning within the group and the IG as a whole, was named its director.¹⁴⁶

Levels of funding for R&D still remained modest in comparison with the massive amounts spent in the late 1920s, but there was some loosening of the purse strings and some additional hiring as well, although much of this change came later, after 1936. A short report on the Ammonia Laboratory prepared in 1935 attributed this gradually improving outlook to the general economic recovery and related sales increases in products stemming from the lab. But the report also indicated that "at least as important was the fact that many development areas suddenly took on broader economic significance as a result of Germany's raw materials and foreign-exchange situation."¹⁴⁷

All in all, then, in terms of products and lines of R&D inquiry, the initial years of National Socialist rule were characterized within the Upper Rhine group by clear recovery from the depths of the Depression and significant reorientation of production and sales. Domestic customers became more important to the group's factories than they ever had been before, with the bulk of production at Leuna and Oppau and about 40 percent of that at Ludwigshafen being directed at the German market. Even at Ludwigshafen, however, the areas of most spectacular growth were those associated with the government's drive for economic self-sufficiency and, eventually, war production. For managers and engineers in the Upper Rhine group, then, the early National Socialist years were ones of great change. For the group's workers, however, the changes wrought by the new government were even more earthshaking.

Social and Labor Policy in the Factories

Depression-era employment levels at the core factories of the Upper Rhine group on the Rhine reached their low point in 1932. With just 12,300 employees total in that year, employment at the core group factories had

¹⁴⁶ Morris, "Ambros, Reppe," especially p. 104.

¹⁴⁷ Curt Schuster, "Die Geschichte des Hauptlaboratoriums 1938–1957," p. 230, typescript, BASF UA; Ammoniaklaboratorium Oppau, "Jahresbericht 1939," p. 4, BASF UA, D 202/3; Untitled Report (Jahresbericht [Annual Report] 1935), July 29, 1935, BASF UA, D 202/2.

declined to its lowest level within the group since 1917 and constituted far less than half its level of 1927. Moreover, this low level of employment was in spite of efforts to stem layoffs through shortening the work week: During 1931 and 1932, the average work week for IG workers, which had ranged from 48 to 56 hours, declined to just 40. In the Upper Rhine group, this shortening of hours had already begun by the end of 1930, with 85 percent of the workers employed for fewer hours per week than normal and plans already afoot to apply this policy to white-collar employees as well.¹⁴⁸

Improvements in sales resulting from generalized economic recovery and National Socialist policies meant increased employment within the group. The number of staff (including waged and salaried employees as well as academics and managers) went up steadily beginning in 1933 to 19,400 in 1936. The increases were directly correlated to enhanced revenue between 1932 and 1935, with the average level of sales per employee remaining fairly stable. Only in 1936 did this change. Revenue per employee within the core factories of the group increased by about 20 percent from 1935 to 1936, indicating the trend that would continue into the war years as steady sales growth was accompanied by ever-tighter labor markets.¹⁴⁹

Undoubtedly, improvements in the employment situation constituted welcome news for the hard-hit regions surrounding the Upper Rhine group's factories, although unemployment in the Rhineland Palatinate, unlike most of the rest of the Reich, continued to remain high until the late 1930s. But steadily improving job prospects were accompanied by an even swifter diminution, and then elimination, of the institutions that had represented and protected the interests of labor. Persecution of trade unions and other worker organizations began as soon as Hitler took power, but intensified with the Reichstag fire and its aftermath.

Initially, the focus was on communists and other more extreme members of the labor movement, and already in March 1933 many of the leaders of far left-wing groups were placed under "protective custody" and sent to concentration camps. At the same time severe legal restrictions were placed on more moderate groups. For example, the Bavarian Minister of the Interior, who was responsible for the area in which the Ludwigshafen and Oppau plants were located, decreed that the moderate free trade union associations would have to sign a loyalty oath that also constituted a promise to avoid all political activity. Members of the NSBO were deputized by the Minister to ensure compliance.¹⁵⁰

¹⁴⁸ Dr. Rötger, "Umsatzanteil pro Belegschaftsmitglied," n.d., BASF IG, T 01; "Maßnahmen der IG Farbenindustrie AG zur Bekämpfung der Arbeitslosigkeit," IG Farbenindustrie AG, Werke Ludwigshafen, Werkszeitung 21 (November 1933): 102; "Niederschrift über die 1. Direktionsbesprechung in Ludwigshafen am 17. Dezember 1930," p. 3, BASF UA, C 13.

¹⁴⁹ Dr. Rötger, "Umsatzanteil pro Belegschaftsmitglied," n.d., BASF IG, T 01.

¹⁵⁰ Braun, *Schichtwechsel*, pp. 97–100.

Of course, official elimination of the existing trade unions did not occur until June 22, 1933, but the handwriting was on the wall much earlier. As mentioned in the first section of this part, the National Socialist government proclaimed the traditional trade-union labor day, May 1, as the “Day of National Labor.” However, on the day after the first state-sponsored celebrations of this holiday in 1933, a coordinated German-wide onslaught on the trade unions took place. SA and SS thugs occupied trade-union buildings in Ludwigshafen and elsewhere, and they arrested trade-union leaders. Shortly afterwards, the workers’ right to strike and many other trade-union prerogatives were removed. At about the same time, the DAF was established. The DAF would eventually become the sole representative of German working people. In the meantime, it and the NSBO squabbled over who would benefit, and to what proportion, from the seized property of the trade unions.¹⁵¹

On February 20, 1934, with the proclamation of the Law on the Regulation of National Labor (*Gesetz zur Ordnung der nationalen Arbeit*), the final steps were taken toward the abolition of workers’ rights. New organizations and official terminology for industrial relations emerged: Reich Works Communities (*Reichsbetriebsgemeinschaften*) were established for each sector of industry, the term used for the workforce of an individual factory was changed from *Belegschaft* (personnel, staff, workforce) to *Gefolgschaft* (followers or following), the latter being aligned far more closely with the Nazi Party’s leadership principle. Even more directly associated with that principle was the designation of an overall “leader of the enterprise” (*Führer des Betriebes*), who was responsible for social and personnel affairs. In the case of the former BASF factories, this position as leader of the enterprise involved responsibility for both Oppau and Ludwigshafen, and Gaus occupied it until his retirement in late 1937. The new law also eliminated works councils and replaced them with “labor councils” and “trustees of labor” (*Vertrauensräte*), which assumed responsibility for maintaining harmony within the factory and overseeing improvements in productivity. But the DAF was emerging as the most powerful organization within this new arrangement of labor relations, and its membership increased to 20 million by 1939. Its “most important task [was] the social management of the *Volksgemeinschaft* in both the factory and at leisure.” We will have cause to return to the DAF and its activities in sections 5 and 7. Here it is worth pointing out that in spite of growing levels of employment, pressure on the labor market, and the activities of the DAF and the trustees of labor, the standard of living for most workers did not improve substantially. It was only after 1936, with arms production in full swing, that take-home pay increased for most workers, although this change was due more to increased hours of work than to wage rises.¹⁵²

¹⁵¹ Braun, *Schichtwechsel*, pp. 97–100.

¹⁵² Braun, *Schichtwechsel*, pp. 101–4; quotation from Klaus Schönhoven on p. 101.

After Hitler's appointment as Chancellor of Germany in January 1933 and the subsequent Nazi seizure of power, management and workers at the Upper Rhine group enjoyed economic recovery, more jobs, and renewed chances for the group's most prominent and troubled product lines. But their joy was tempered by unease at many of the regime's plans and practices. For managers, many of whom no doubt welcomed the end of the power of the Weimar-era trade unions, the German Labor Front was at best an imperfect alternative. There was also discomfiture at increasing levels of state direction of investment and production, and the IG, led by the Upper Rhine group, developed a number of measures such as the Army Liaison Office to try to retain some measure of autonomy. For workers, higher levels of employment were accompanied by a virtually complete loss of organizational autonomy. The already dramatic changes experienced by the Upper Rhine group, however, were taken to a completely new level during the following years as the Reich, supported by IG Farben and the factories of the BASF group, embarked on ever more serious preparations for a modern, mobile war.

5. AUTARKY AND PREPARATION FOR WAR, 1936–1939

The Four Year Plan Organization and Preparation for War

From 1936 to 1939, the National Socialist government engaged in two separate, but closely related, sets of programs. The first set was designed to increase economic self-sufficiency, or autarky. The second was aimed at making careful preparations for conducting a war of aggression. Both sets of programs profoundly affected and were affected (and to some extent effected) by the Upper Rhine group and its leadership, most prominently Carl Krauch. At the same time, the group's role was much more important in the autarky program than in planning for war.

Nevertheless, war planning began remarkably early at IG Farben. As mentioned in the previous section, the decision of the Central Committee of the IG managing board to form an Army Liaison Office was formally announced by Krauch to ten factories associated with IG's *Sparte I* on September 5, 1935, although work on establishing this Office began much earlier. It was to be responsible for the central processing of information within the IG on technical, economic, and political matters related to the establishment of a war economy and for central liaison with army and government officials in this regard.¹⁵³ An ever-growing number of experts worked in the Liaison Office, with virtually all of the newer ones coming from *Sparte II*, since Krauch and

¹⁵³ Krauch and Fahrenhorst to various factory leaders in *Sparte I*, "Betr.: Wehrwirtschaft. Zentralstelle der IG für alle wehrwirtschaftlichen Dinge und wehrpolitischen Fragen," September 5, 1935, GARF, Moscow, 1457-49-2.

his Oppau compatriots, who had started the Office, had in the meantime moved into government service.¹⁵⁴

After its official formation, the Liaison Office began gradually to gather data from the various IG factories. Very sensibly, given the concern's magnitude and the Office's own relatively modest personnel resources, its staff delegated much of their work. One of the main jobs it oversaw was the production of a "Mob-Kalender" for individual factories, which was undertaken by a designated representative.¹⁵⁵ This activity is an important reason why the plans that were drawn up in the individual factories were defensive in character, both from a military and from a business point of view, as the example of the Upper Rhine group demonstrates.

Because the group's Rhine-based factories stood less than 60 kilometers from the French border, it did not appear sensible – especially to the authorities in Berlin – to include them fully in plans for war production. Testifying at his trial at Nuremberg after the war, Carl Wurster, who became the official leader of the core BASF plants at Ludwigshafen and Oppau in January 1938, claimed that air-raid precautions were no more than minimal by the outbreak of war. Expenditures for this purpose, he argued, amounted to just RM 10 per employee. Wurster insisted, furthermore, that war plans were "less to mobilize Ludwigshafen [sic] for war than to *immobilize* the plant. The authorities apparently believed that because of the situation of being very near the Western border of the Reich, Ludwigshafen was in great danger, and therefore would not be able to produce at all."¹⁵⁶

Clearly, such views of authorities in Berlin were not shared by managers at Ludwigshafen and Oppau, especially since accepting them would involve acceptance of their logical conclusion: the need to move parts of production facilities to other sites further from the border. Wurster therefore instructed those responsible for mobilization planning at his factories "to procrastinate and to see that nothing foolish was done," in particular with regard to moving plants and equipment.¹⁵⁷ Although Wurster's testimony stems from the postwar period, it certainly seems plausible given the uncertainties of the war on the western front through mid-1940. Moreover, production at Ludwigshafen and Oppau was blocked briefly at the beginning of the war

¹⁵⁴ Ernst Struss, "Vermittlungsstelle W (Wehrmacht)," June 20, 1945, BASF IG, C 10/2. [This file is a photocopy of Akte 201: Vorstand IG aus Nachlass Struss, original in Archiv Farbenwerke Hoechst.]

¹⁵⁵ A blank copy of the *Kalender* is in IG Farbenindustrie Aktiengesellschaft, "Mob-Kalender für das Werk," November 10, 1936, in GARF, Moscow, 1457-49-4.

¹⁵⁶ United States Nuremberg War Crimes Trials: United States of America v. Carl Krauch et al. (Case VI), Transcript, vol. 114, testimony of Carl Wurster on April 9, 1948, p. 10925, IWM, London. Emphasis added.

¹⁵⁷ United States Nuremberg War Crimes Trials: United States of America v. Carl Krauch et al. (Case VI), Transcript, vol. 114, testimony of Carl Wurster on April 9, 1948, p. 10928-9, IWM, London.

by the *Reichsstelle Chemie*, the official governmental office responsible for the chemical industry.¹⁵⁸

Wurster's delaying tactics were effective in safeguarding production equipment on site, although it did prove necessary during the initial months of the war to move stockpiles of vital raw material, intermediates, and catalysts. At the insistence of the Army High Command and Hermann Göring's camouflage stockpiling organization, Wifo GmbH, reserves of a number of key products were moved, including urea, nitrogen compounds of direct relevance to the war, and hydrogenation catalysts, although the IG sought, and received, compensation for the costs of this transport. By summer 1940, however, the rapid victory against France led to the suspension of even these limited measures, and Ludwigshafen and Oppau could continue their war production into 1945.¹⁵⁹

Separate from, but related to, the detailed planning for mobilization of the individual IG factories were much more comprehensive plans to establish a broad basis for economic self-sufficiency in Germany through the establishment of a Four Year Plan Organization under Hermann Göring. Carl Krauch was again the vital link between the regime on the one hand and IG Farben and the Upper Rhine group on the other.

Göring had collected a number of different offices and responsibilities in the initial years of Nazi rule in Germany.¹⁶⁰ It was thus Göring to whom Economics Minister Schacht and War Minister General Werner von Blomberg turned in spring 1936 to quell disputes within the government and between government and business over the use of foreign exchange to purchase food and raw materials for stockpiling. His service would require an addition to Göring's responsibilities. Hitler appointed him plenipotentiary for raw materials and foreign exchange at the end of April 1936, and Krauch was immediately named head of R&D within Göring's nascent organization. Although he continued to draw his salary from the IG, Krauch was from that point forward more absorbed in government work than in work for the trust, and he brought two members of the IG Army Liaison Office, both originally also from Oppau, on board with him. The new developments had two

¹⁵⁸ IG Farben, Vermittlungsstelle W (Diekmann), "Aktenvermerk Betr. Vergütung von Umlagerungskosten," December 4, 1939, BASF UA A 865/55.

¹⁵⁹ IG Farben Ludwigshafen, Direktionsabteilung, "Aktennotiz betr. Auslagerung," November 4, 1939; IG Farben, Vermittlungsstelle W (Diekmann), "Aktenvermerk Betr. Vergütung von Umlagerungskosten," December 4, 1939; Reichswirtschaftsministerium II Chem to IG Farben Berlin NW 7, August 2, 1940; all in BASF IG, A 865/55. The "changed strategic situation" (*veränderte strategische Lage*) is given as a reason for ceasing the practice of remote stockpiling in late June 1940. "Direktionssitzung Ludwigshafen," June 28, 1940, BASF UA C13.

¹⁶⁰ Unless otherwise indicated, this account of the Four Year Plan and Krauch's position in it is based largely on Hayes, *Industry and Ideology*, pp. 155–85, 205–9. See also Petzina, *Autarkiepolitik im Dritten Reich*.

major consequences for the Office. First, with the disappearance of Krauch, its most powerful and influential protector, it lost most of its original significance within the firm. Second, although the Liaison Office continued to exist, it was from mid-1936 onwards dominated primarily by representatives of *Sparte II* rather than *Sparte I*.¹⁶¹

Hitler announced a new and vastly expanded Four Year Plan at the Nazi Party congress in September 1936, and Göring, in turn, produced an organizational plan to implement it in October. Krauch again assumed the leadership of the Four Year Plan R&D staff. Now fully ensconced in Berlin, Krauch devoted more and more of his time and energy to organization of industrial investment and raw materials stockpiling for the purpose of domestic self-sufficiency. And his power and influence grew dramatically. It is estimated that his staff was responsible for nearly half of all industrial investment outside the coal and electrical generation industries between 1936 and 1939.

By 1938, Krauch's success in impressing his superiors and surviving the bureaucratic turf wars that characterized much governmental life in the Third Reich led to a further move up the career ladder. In August, Göring appointed him "Plenipotentiary-general for the chemical industry." In the same year, Krauch's Karinhall Plan for industrial investment (prepared partly by Otto Ambros, the Ludwigshafen-based IG manager who was responsible for much of the buna program and who had once worked for Krauch) defined industrial planning in Germany on the eve of the war. In 1938 Krauch also became the head of the Reich Office of Economic Development, which was associated with the Four Year Plan Organization but which had additional responsibilities for newly acquired capacity in Austria (1938) and the Sudetenland and Czechoslovakia (1938–9).

The Four Year Plan that Hitler announced in September 1936 went through a number of different versions, and it was never implemented in its entirety. But it channeled a substantial proportion of industrial investment during the last peacetime years of the Third Reich, focusing on a number of key industrial areas that were of vital importance for independence from imports and preparation for war. Chemicals and light metals, production areas in which the IG played a key role, were some of the most important of them. This fact, combined with Krauch's prominent position in allocating investment under the Plan, has led some historians to claim that the Four Year Plan was an IG Farben Plan.¹⁶²

¹⁶¹ Ernst Struss, "Vermittlungsstelle W, Berlin," September 24, 1945; Ernst Struss, "Vermittlungsstelle W (Wehrmacht)," June 20, 1945; both documents in BASF IG, C 10/2. [This file is a photocopy of Akte 201: Vorstand IG aus Nachlass Struss, original in Archiv Farbwerke Hoechst.]

¹⁶² Petzina, *Autarkiepolitik im Dritten Reich*, p. 123.

As Peter Hayes has pointed out, the IG did indeed enjoy a major infusion of investment funds through the Plan, securing an estimated 20 to 25 percent of total investments made under it. And the investments paid off to a large degree. The five major areas within the IG's production palette favored by the Plan – gasoline, nitrogen for explosives, metals, rubber and plastics, and fibers – were responsible for over 40 percent of the IG's sales increases during the years 1936 to 1939. The share of the five areas in IG turnover rose from 28.4 percent in 1936 to nearly one-third in 1939.

At the same time, however, Hayes makes it clear that the Four Year Plan investments did not change the IG's relative position in the German chemical industry: The concern received no more, and probably somewhat less, than what one would expect considering its share in pre-1936 chemical production. Indeed, the investments were made at governmental direction but with relatively little direct government aid, and proceeds earned on the basis of these investments were taxed at higher and higher rates. For the most part, the IG financed the new investments from its own funds, deploying monies that it was not otherwise permitted to use. With the Plan's increased emphasis on fuel production beginning in 1937 and 1938, the share of the IG in total Four Year Plan investment declined. Although the new plants often used IG technology and therefore involved license payments to the conglomerate, the IG directly participated in a minority position in just two of them, Scholven and, later, Pöllitz.¹⁶³

But these findings apply to the IG as a whole. What about the Upper Rhine group in particular? After all, three of the previously mentioned production areas – gasoline, nitrogen, and rubber and plastics – were ones in which the factories of the Upper Rhine group held a disproportionately large interest within the IG. The effects of these investments were far-reaching, not just in terms of production profile but also in terms of the impact on technological capabilities and capacity.

Synthetic fuels constituted one product line with clear relevance to the war effort. The Upper Rhine group's Leuna works continued as the largest single production unit for synthetic fuel in Germany during most of the late 1930s, although it was not expanded to its ultimate capacity of 650,000 tons per year until after the war had started. Total production at Leuna went well over the 300,000 ton mark during 1936, rising to nearly 400,000 tons by 1939. In addition, a number of technological improvements led to a change in the factory's product mix, with high-value-added products vital to the war effort coming more and more to the fore. Through 1935, normal gasoline was almost all that Leuna had ever produced. Starting in 1936, however, in preparation for the war, the plant manufactured substantial quantities of aviation spirit, and in 1939 diesel fuel was produced there for the first

¹⁶³ Hayes, *Industry and Ideology*, pp. 181–3.

time. During the war itself, Leuna's capacity for fuel production increased dramatically, with an emphasis almost exclusively on aviation spirit and diesel fuel.¹⁶⁴

In addition to the Leuna works, the Upper Rhine group contributed to fulfilling Germany's petroleum needs through the Oppanol production plant at Oppau, which manufactured synthetic lubricants. Added in small amounts to normal lubricants, Oppanol could improve viscosity substantially and extend the temperature range. Although output was relatively modest at first, it climbed substantially through 1942 and proved extremely valuable to the German war effort. In addition, an ethylene-based lubricant that had special applications in airplane engines was developed at Oppau in 1934 and produced at Leuna in small quantities beginning in 1936–7. Output amounted to only 20 to 30 tons per month by 1937 but grew to 2,257 tons per month by 1939.¹⁶⁵

For IG Farben, the Leuna works remained the sole wholly owned hydrogenation facility except for a small pilot plant for R&D in Ludwigshafen and the relatively small capacity for production of synthetic lubricants at Oppau. Under government pressure, however, the IG did participate financially in the BRABAG project to build three facilities in central Germany based on brown coal tar. In addition, the IG embarked on a minority interest in a joint venture with a mining company owned by the Prussian state to build a hydrogenation plant at Scholven near Gelsenkirchen in late 1935. It also participated along with the German subsidiaries of Standard Oil of New Jersey and Royal Dutch Shell in financing construction of a very large plant at Pöllitz near Stettin (whose capacity of 700,000 tons per year was to exceed Leuna's).¹⁶⁶ This project was agreed upon in 1937 but not completed until 1940. The companies underwriting the remaining six hydrogenation plants constructed in Germany and Greater Germany through 1943, however, did so without the financial participation of the IG.

Nevertheless, all of the hydrogenation projects undertaken in Germany during the late 1930s and early 1940s absorbed considerable attention and technological capacity for the Upper Rhine group and, not incidentally, earned considerable income for the concern of which it was a part. The design of all of the German hydrogenation plants was undertaken in Ludwigshafen, with Ludwigshafen and Leuna personnel also being instrumental in running the company that oversaw much of the related construction, Mineralölbau GmbH. The Upper Rhine group's lead plant also provided some of the apparatus necessary to run the hydrogenation plants. At the same time, Ludwigshafen's and Leuna's know-how and continuous development work

¹⁶⁴ "Produktion und Gestehskosten Leuna," June 27, 1947, Pier Akten 49, BASF UA.

¹⁶⁵ "Schmierölproduktion der Oelfabrik Oppau," July 15, 1947, BASF UA M 503/1; Hermann Zorn, "Eidesstattliche Erklärung," n.d. [1947], BASF UA M 503/1.

¹⁶⁶ See Karlsch and Stokes, *Faktor Öl*, pp. 194–7, 199, 202, 234.

enabled the plants to work effectively, with steady improvements in yield and quality. Total installed capacity for these plants and those constructed with crucial assistance from the group in England, Italy, and Holland between 1934 and 1943 amounted to some 7 million tons per year of finished product, most of which was already in use by 1940. And the scale of the completed capacity was as impressive as the speed with which the plants were thrown up.¹⁶⁷

Besides earning one-off fees in each case to pay for the input of Ludwigshafen and Leuna's personnel, design and project management capacity, and know-how in the design and construction of the plant, the plants also brought in substantial regular income to the IG from royalties and license fees. Through the second quarter of 1942, the three BRABAG plants alone paid a total of RM 13.9 million in royalties to the IG. Overall actual royalty receipts through that time from all sources (except Esso) amounted to RM 24 million, with millions more owed to the firm from as yet uncollected royalties on production that was already completed. Additional dollar income flowed in from companies with licenses abroad, at least into 1940. By the end of 1943, the total royalties paid by companies other than Standard Oil of New Jersey for licenses on the Upper Rhine group's technical expertise in hydrogenation had earned its parent company RM 55.8 million. It was these fees (along with the even more substantial one-off fee payment to IG Farben by Jersey Standard during the late 1920s) that turned what otherwise would have been a *loss-making* venture into a profitable one, with overall profits to the conglomerate from synthetic gasoline (including sales, royalty fees, and license income) amounting to RM 43 million between 1927 and 1943.¹⁶⁸

Despite the Upper Rhine group's heavy commitment of technological capacity to provide Germany with fuel, mainly for the forthcoming war, such allocations were not the only drain on that capacity in the late 1930s. The group had simultaneously renewed its activities abroad with a vengeance during the period. As already mentioned, two of them involved hydrogenation plants, one in Italy in 1937 and the other in Holland in 1938–9. However, the activities of the Upper Rhine group in its traditional areas of strength, methanol and ammonia, were even more extensive in Japan. In all, a total of eight projects were undertaken there between 1935 and 1939. Some of them were no more than extensions of existing plant capacity, but others involved design and construction of complete and entirely new plants.¹⁶⁹

¹⁶⁷ "Von der BASF in Deutschland und im Ausland gebaute Anlagen," Bl. 7, n.d. [ca. 1962], BASF IG, R 01/1; Mach, *Entwerfen und Bauen*, pp. 106–7.

¹⁶⁸ Hochdruckversuche Lu, "Lizenzen," October 16, 1942, p. 2; Hochdruckversuche Lu, "Lizenzen," October 24, 1942, both in BASF UA A 25, collection of material for history of firm; "Kosten der Hydrierung," June 30, 1947, BASF UA Pier Akten 49.

¹⁶⁹ "Von der BASF in Deutschland und im Ausland gebaute Anlagen," Bl. 7, n.d. [ca. 1962], BASF IG, R 01/1; Mach, *Entwerfen und Bauen*, p. 114.

As if these substantial efforts in research, development, plant planning, and construction in synthetic fuels and more traditional synthesis technologies were not enough, they were accompanied by another massive effort. Technical and scientific personnel of the Upper Rhine group played a key role in the establishment of a large-scale synthetic (“buna”) rubber industry in Germany starting in the mid-1930s.

For the group, the buna program differed from the others in a number of respects. First, it started much later, with construction of the first plant not underway until the mid-1930s. Second, the technologies involved were still very much under development as the first plant was constructed. It thus proved necessary to build the first plant on a cumbersome, but relatively dependable, basis rather than deploy the most promising set of technologies. Third, unlike the synthetic fuel effort, the technologies and know-how for the buna program came not just from within the group but rather from a broader constituency within the conglomerate, including significant participation from all three of the major IG works groups.¹⁷⁰

Nevertheless, Upper Rhine group factories and personnel were clearly the most important contributors to the IG buna projects. Technical breakthroughs at Ludwigshafen-based laboratories, especially the advances by Walter Reppe, had been instrumental in achieving large-scale production in the first place, and steady R&D work there continued to be vital even though IG Farben’s Central Rubber Laboratory was built in Leverkusen rather than Ludwigshafen (1935–9). Personnel from the group’s nitrogen section had taken the lead in gaining governmental support for renewed expansion of the program. And as of spring 1935, Ludwigshafen’s Otto Ambros was the chief coordinator of the program, responsible for overall planning and management. Ludwigshafen served as the general contractor for the construction of the facilities, much of which was carried out by Leuna-based Mineralölbau GmbH, also closely associated with the group. Moreover, Ludwigshafen and Leuna provided plans and equipment for a variety of key facilities for the factories, including, for the first one at Schkopau, the butadiene and styrene production plants. Finally, the BASF group provided many of the most important technical and managerial resources for the actual operation of the plants.

Schkopau, the first of the synthetic rubber facilities to come on-line, was initially owned and operated by the nearby Leuna works. But even after it became an independent limited company, it remained close to the original parent plant, both geographically and in terms of personnel. Because of Ambros, it, too, remained allied closely to Ludwigshafen. Carl Wulff, from Ludwigshafen-Oppau, became the plant manager (*Betriebsführer*) at

¹⁷⁰ On synthetic rubber development at IG Farben, see Peter Morris, “Development of Acetylene Chemistry and Synthetic Rubber”; Morris, “Ambros, Reppe”; Plumpe, “Industrie, technischer Fortschritt und Staat.”

Schkopau, and Wilhelm Biedenkopf, also originally from BASF, was its chief engineer. Moreover, there were many others who made the journey eastward from the core plants on the Rhine. When a second buna facility was established at Hüls, Ulrich Hoffmann, who had been Wulff's deputy at Schkopau, took over the plant management in November 1938. Paul Baumann, who had helped in initial development work on the pioneering electric arc process for producing acetylene under the auspices of the Upper Rhine group at the Esso facility in Baton Rouge between 1932 and 1935, eventually also worked at the plant, and later succeeded Hoffmann as *Betriebsführer*. The third buna facility was built between the Ludwigshafen and Oppau plants themselves after the war began. The fourth and final buna facility, near the Auschwitz concentration camp, was also started after the beginning of the war but never completed. Again, a large number of key personnel at IG Auschwitz traced their professional lineage to the Upper Rhine group factories.

This relationship was more than one of mere genealogy. Wulff, along with 63 other key managers and white-collar workers at Schkopau actually received their paychecks from Ludwigshafen. The other technical and scientific personnel of the new plants – not just at Schkopau but also at Hüls – were maintained in the parent factory's lists of chemical and engineering personnel, and Ludwigshafen was presumably also responsible for paying them.¹⁷¹

The ever-growing flood of projects for which the Upper Rhine group assumed responsibility had its consequences. Any one of them would have absorbed much of the technological capacity of the Upper Rhine group plants, substantial though it was. But the combination of all the projects, at home and abroad, in synthetic fuel and rubber as well as in ammonia and methanol, stretched the group's technological resources to the breaking point. One of the effects was that Ludwigshafen was forced to abandon its previous practice of maintaining constant technical contacts with the plants it designed and constructed, especially for firms outside the IG. They, along with those inside or largely controlled by the IG, were forced to create their own technical planning offices alongside amenities such as repair facilities and workshops.¹⁷²

At the same time that the projects stretched resources to their limits, however, the Upper Rhine group's hectic activity in plant design and construction, especially in the areas of synthetic fuel and rubber, also created a certain esprit de corps among the group's scientists and technical personnel. This ethos was, however, in direct contrast to the organization of production within the group, which, by 1938, was divided along a number of different fault lines. Leuna had already developed a considerable degree of independence much

¹⁷¹ "Fragebogen für Beteiligungen der IG Farbenindustrie: Schkopau," May 18, 1938; "Fragebogen für Beteiligungen der IG Farbenindustrie: Schkopau," May 23, 1939; both in BASF IG, A 251/1.

¹⁷² Mach, *Entwerfen und Bauen*, p. 119.

earlier, and by 1938 organizational and personnel changes within the IG (which will be dealt with in the section on production, sales, and research trends) led to splits in leadership between Oppau and Ludwigshafen, and even within Ludwigshafen itself. In the area of technical personnel, though, the spirit and reality of the old BASF group continued to dominate.

It is telling, for instance, that one of the first institutional innovations undertaken by Wurster after his promotion to overall leader of the works group in January 1938 was the reinstitution of technical direction “conversations” just four days after he assumed his new office. The frequent meetings were attended by high-ranking technical-managerial staff (including Wurster and Ambros) as well as by the group’s leading scientists and engineers.¹⁷³ It is no accident that lists of engineers and chemists compiled for the Upper Rhine group had expanded by the late 1930s and early 1940s to include not just Ludwigshafen and Oppau, but also Schkopau and Hüls. Even in 1938, long after the Upper Rhine group had allegedly ceased to exist except within *Sparte* II owing to the divisional structure devised for the IG in the early 1930s, chemists and academics from Ludwigshafen, Oppau, and Leuna were officially listed as belonging to the Upper Rhine group.¹⁷⁴

Production, Sales, and Research Trends

The regime’s renewed commitment to autarky, war preparations, and implementation of its racial policies from 1936 to 1939 had substantial implications for German big business. For IG Farben, but even more so for the Upper Rhine group, the opportunities presented by National Socialist policies were substantial, and they were exciting to many, especially younger, technical personnel. But on the other side of the equation stood a number of threats and challenges. For one thing, renewed commitment to autarky and implementation of racial policies would clearly have an impact on export

¹⁷³ “1. Technische Direktions-Besprechung in Ludwigshafen am 4. Januar 1938,” January 4, 1938, in BASF UA C 13.

¹⁷⁴ On the indication that the works groups continued to exist only in Sparte II after 1930, see Ernst Struss, “Erklärung unter Eid. Die Betriebsgemeinschaften und die Entwicklung der IG von 1925–1929,” August 30, 1947, p. 15, NI-9487, United States Nuremberg War Crimes Trials: United States of America v. Carl Krauch et al. (Case VI), Document Book II, BASF UA. See also the organizational chart for IG Farben from 1938 onwards in Hayes, *Industry and Ideology*, p. 391. Lists of engineers and chemists at the Upper Rhine group – which included Ludwigshafen, Oppau, Leuna, and eventually Schkopau and Hüls – are located in two files under the designation C 623 (Ingenieurlisten von BASF bezw. Betr. Gem. Oberrhein, 1928–1940; and Verzeichnis der Chemikern der BASF 1931–1947. Serie 1) in BASF UA. In contrast, the files on the total workforce in the archive [C 621/2 (Der Mensch in BASF), C 627/2 (Gesamt Gefolgschaft [sic], 1865–1960), and C 62205 (Sozialentwicklung: Arbeiterstand 1897–1946)] contain entries only for Ludwigshafen and Oppau. See also material in “Rundschreiben, Ludwigshafen,” April 8, 1938, in C 623, Verzeichnis der Chemikern der BASF 1931–1947. Serie 1.

sales, which were especially important to the factories of IG's *Sparte* II. By 1936 the corporation's other divisions were largely dependent upon the domestic market, with *Sparte* I exporting only 13 percent of its production, and *Sparte* III selling just over 25 percent of its output abroad. In contrast, *Sparte* II earned over 50 percent of its revenues from exports, while the proportion at Ludwigshafen stood closer to 66 percent.¹⁷⁵ Increasing international political and commercial tension clearly posed a grave danger to exports. In addition, though, there were substantial financial pressures on the firm, with the demands of the regime (and of the corporation itself) for new construction outstripping even the immense resources of the conglomerate. Finally, the growing necessity for the firm to participate actively in the politics of the regime, if only to shape policies in the IG's own interest, drew many of its senior staff away from management and into government. Krauch was merely the most prominent example of this trend.

The altered business environment was reinforced by a changed legal environment. In keeping with National Socialist ideology, the Law on the Regulation of National Labor, which took effect in February 1934, required the appointment of a special, overall leader of the enterprise who would be responsible for social and personnel matters within a given plant complex.¹⁷⁶ The German Stock Corporation Act of 1937 forced consolidation of many of the IG's subsidiaries into the main company and demanded still more streamlining of its managing and supervisory boards. In practice, the managing board's narrow Working Committee became the new managing board, whereas its powerful Central Committee, which had been formed by Bosch in 1930–1, saw its authority decreased.

These alterations to the business and legal environment, in turn, had a pronounced effect on the Upper Rhine group. Gaus, who had been plant manager at Ludwigshafen and overall group leader since 1933, retired at the end of 1937. He was replaced by Carl Wurster, who became a member of the managing board of the IG as well. Wurster became the *Betriebsführer* of the Ludwigshafen-Oppau complex, but his direct authority was largely restricted to the social and personnel sphere. In terms of technology and production, he controlled only the inorganics section of Ludwigshafen. The much larger organics section was controlled by the IG's fast-rising star Otto Ambros, who was closely associated with the buna program. Ambros, too, became a member of the IG managing board in 1938. The largest units in

¹⁷⁵ IG Farben, Vermittlungsstelle W (Brüning) to Reich War Ministry (Godlewski), July 7, 1936, GARF, Moscow, 1457-49-2.

¹⁷⁶ Affidavit Carl Krauch, March 28, 1947, NI-6120, in National Archives, College Park Maryland, Record Group 466, High Commission for Germany, Decartelization Division, Security classified records IG Farben, box 13; Ernst Struss, "Erklärung unter Eid," August 26, 1947, BASF IG, C 10/2. [This file is a photocopy of Akte 201: Vorstand IG aus Nachlass Struss, original in Archiv Farbwerke Hoechst.]; Dokumentenbuch Wurster I, See Dok. W 304, pp. 27–39, especially p. 28, BASF UA.

the core Ludwigshafen-Oppau complex, including the nitrogen department at Oppau, the Ammonia Laboratory, and the high-pressure experimental plant, had been the responsibility of Carl Krauch. But the growing pressures of his responsibilities in Berlin from 1934 onward forced him to turn over the day-to-day management of the vast complex to Martin Müller-Cunradi, who eventually also became a member of the IG managing board, although not until 1943. A fourth member of the IG managing board, August von Knieriem, who was responsible for the conglomerate's legal and patent affairs, was also based at the core Upper Rhine group complex.¹⁷⁷ The three board members responsible for production at Ludwigshafen and Oppau all joined the National Socialist Party by 1938, while von Knieriem joined in 1942.¹⁷⁸

The new management structure established at Ludwigshafen-Oppau in 1938 remained intact through the end of the war. It symbolized both the restored power and prestige of the former BASF within IG Farben and the extent to which the Upper Rhine group had become something entirely different from what it had once been.

The group's enhanced levels of power and prestige were obvious and clearly a function of its capacity to provide the technologies vital to the National Socialist political agenda: 4 of the approximately 20 members of the IG managing board were based in a single factory, and three of them – Wurster, Ambros, and Müller-Cunradi – met together with senior factory directors almost daily to coordinate the core factories' affairs. They had a powerful potential ally in government in the form of Carl Krauch, whose core staff was also drawn from the group. Krauch, too, continued as a member of the IG managing board until 1938 and then rejoined the concern in a nonexecutive capacity in 1940, when he became Bosch's successor as chairman of its supervisory board. What is more, the group directly or indirectly provided virtually all of the new blood for the IG's managing board. Of the seven new members of the managing board appointed between 1933 and 1945, five came from the Upper Rhine group's ranks: Ambros, Wurster, and Müller-Cunradi; Leuna's Heinrich Bütefisch, who had begun his career as a chemist in Ludwigshafen in 1920; and Max Ilgner, the head of Berlin NW7, who had started out as a salesman at Ludwigshafen in 1924.¹⁷⁹

¹⁷⁷ Affidavit Carl Krauch, March 28, 1947, NI-6120, in National Archives, College Park Maryland, Record Group 466, High Commission for Germany, Decartelization Division, Security classified records IG Farben, box 13; Alfred von Nagel, "Organisationsplan Ludwigshafen-Oppau 1938 1945," January 29, 1948, BASF UA Dokumentenbuch Wurster I, Dok. 2, Bd. I.

¹⁷⁸ Hayes, *Industry and Ideology*, p. 200.

¹⁷⁹ Affidavit Carl Krauch, March 28, 1947, NI-6120, in National Archives, College Park Maryland, Record Group 466, High Commission for Germany, Decartelization Division, Security classified records IG Farben, box 13; Hermann Bässler, "Eidesstattliche Erklärung, Eintritt in den Vorstand der IG Farbenindustrie AG seit 1933," BASF IG, C 10/2. [This file is a

The appearance of greater power and prominence for the group was, however, just that, an illusion. For at the same time, and for many of the same reasons, its leadership was becoming more and more diffuse and uncoordinated. Long gone were the days when Carl Bosch's powerful personality ensured unified leadership not just in Ludwigshafen and Oppau but also between the core factories and the much larger complex at Leuna. As Bosch became more preoccupied with the leadership of the IG combine rather than the Upper Rhine group itself, Leuna established a greater and greater degree of independence.¹⁸⁰ By the late 1930s, in particular owing to National Socialist policies of autarky and the strength of its leadership through such men as Bütefisch and Christian Schneider, both of whom had started out in the factories of the Upper Rhine, Leuna's independence from the core factories in terms of production was complete. Only in the area of technology, especially plant design and construction, did Leuna continue in its more junior role vis-à-vis Ludwigshafen and Oppau.

Oppau had started to establish its own independence during the late 1920s and early 1930s, in no small part owing to the personality of Carl Krauch, and the IG's division into *Sparten* reinforced this separation of Oppau (*Sparte I*) from Ludwigshafen (*Sparte II*). But the organizational reforms of the late 1930s took this process of atomization of leadership to a new level by dividing technical control of the Ludwigshafen plant itself. Wurster was indeed the *Betriebsführer* of the Ludwigshafen-Oppau complex, and he led attempts to establish closer links with the IG sales staffs in Frankfurt in order to coordinate the group's technical affairs through reestablishment of the technical direction meetings as of 1938.¹⁸¹ But Wurster had "no higher authority than Ambros and Müller-Cunradi,"¹⁸² a state of affairs largely due to the independent power positions that Ambros and Müller-Cunradi had been able to carve out for themselves as a result of National Socialist autarky policies. Through his influential position in the buna synthetic rubber program, Ambros in particular was able to establish a certain degree of

photocopy of Akte 201: Vorstand IG aus Nachlass Struss, original in Archiv Farbwerke Hoechst.]

¹⁸⁰ Ernst Struss, "Erklärung unter Eid. Die Betriebsgemeinschaften und die Entwicklung der IG von 1925–1929," August 30, 1947, p. 4, NI-9487, United States Nuremberg War Crimes Trials: United States of America v. Carl Krauch et al. (Case VI), Document Book II, BASF UA.

¹⁸¹ Eduard Weber-Andreae, "Tagebuch," vol. 8, p. 106, BASF IG, T 1101/16. [This file is a photocopy of German documents microfilmed and originally held by the U.S. National Archives, T-83, Roll 90, Frames 3463219–4606: "A series of folders containing photostatic copies of a diary, some parts poorly legible, kept by Direktor Eduard Weber-Andreae of IG Farben, 1936–1943"]; "1. Technische Direktions-Besprechung in Ludwigshafen am 4. Januar 1938," January 4, 1938, in BASF UA C 13.

¹⁸² Affidavit Carl Krauch, March 28, 1947, NI-6120, p. 2, in National Archives, College Park Maryland, Record Group 466, High Commission for Germany, Decartelization Division, Security classified records IG Farben, box 13.

independence by means of his close connection to Fritz ter Meer, the powerful head of *Sparte II*.

The group's close connection to Krauch also provided the illusion, but not the reality, of enhanced power and prestige. Krauch was more and more distracted from the affairs of his concern, and of the Upper Rhine group in particular. As Peter Hayes has pointed out, his growing responsibilities within governmental organizations meant that, to a certain degree, he and those who accompanied him into government service "went native," championing his organizations' interests rather than those of his employer.¹⁸³

To a great extent, therefore, the former BASF factories were no longer playing a prominent role in defining the corporate culture of IG Farben, despite what the positions of its personnel within the concern's leadership might seem to have indicated. Instead, the Upper Rhine group was assuming key characteristics of the large concern of which it was a part. Overlapping jurisdictions and splintering of authority – these were the most salient characteristics of both the trust's and the group's new organizational scheme. These characteristics, which tended to undermine the group's internal coherence, derived, in turn, from the very root of its apparent power, that is, from its capabilities in technologies associated with autarky and preparation for war. The only exception to this trend toward splintering of the group was the crucial area of technical and scientific personnel.

Despite the tendency toward atomization within the group, it is clear that the years immediately before the outbreak of the war were exciting and lucrative for the Upper Rhine group plants. As might be expected, given the importance of the plants of *Sparte I* for both autarky and the war effort, expenditure on the new plant was high in 1936, and grew substantially as the war approached. A total of RM 38.9 million was spent in the division in 1936, and that figure soared to RM 66.8 million in 1939, with the lion's share going to investment in the new plant at Leuna.¹⁸⁴

But it was not just the Oppau and Leuna facilities that were singled out for heavy investment during the late 1930s. It is telling that virtually all of the largest expenditures by the IG were for the plants of the Upper Rhine group or for those closely associated with it. The largest single outlay for the concern from 1937 to 1940 was the RM 212 million spent on the Schkopau facility, with spending on the nearby Leuna plant coming in second at RM 177 million. The third largest destination for heavy investment during the period was the Hüls facility, again closely associated with the Upper Rhine group. It received RM 127 million between 1937 and 1940. Next in line came the facilities of the Bitterfeld-Wolfen complexes, largely for production

¹⁸³ Hayes, *Industry and Ideology*, p. 178.

¹⁸⁴ TEA, "Ausgaben für Neuanlagen," December 13, 1940, BASF IG, C 30/2; Tea, "Ausgaben für Neuanlagen der Hauptgruppe I," February 17, 1942, BASF IG, C 30/3.

of light metals, but they were followed very closely by the core plants of the group, Ludwigshafen and Oppau, each of which attracted RM 76 million. In contrast, the central factories of the other two large western German works groups, Leverkusen and Hoechst, each received well under RM 60 million in investment between 1937 and 1940.¹⁸⁵

During the last peacetime years of the Third Reich, extensive investment in new plant and additions to existing facilities for the factories associated closely with the Upper Rhine group translated into rapidly escalating production and sales. True, total sales stemming from Ludwigshafen and Oppau alone increased by just 2 percent between 1935 and 1936. But they then expanded by 55 percent between 1936 and 1937, and a further 46 percent between 1937 and 1939. In fact, total proceeds from the core factories amounted to over RM 468 million in all in 1939.¹⁸⁶

Oppau continued to contribute heavily to production of nitrogen and methanol, while Leuna added a considerable proportion of German synthetic fuel manufacture, in particular highly valuable aviation spirit. Ludwigshafen, along with Oppau, maintained a presence in a variety of production areas, and the factory slightly enhanced its overall contribution to the IG's ever-rising overall sales of chemicals. But the core factory complex at Ludwigshafen-Oppau was especially successful in expanding its plastics capabilities, which were vital to autarky and war-related programs. Total earnings from plastics for the IG more than quadrupled between 1936 and 1940, going from RM 1.6 million to RM 7.1 million. By 1938, the core factories of the Upper Rhine group produced about 75 percent of the plastics sold by the IG although their share declined to just under 70 percent by 1940.¹⁸⁷

In addition to this noteworthy sales and production performance, especially in cutting-edge sectors, the Upper Rhine group's plants remained essential to the IG's research effort in the years leading up to the outbreak of war. R&D expenditures in new areas for *Sparte I* grew substantially

¹⁸⁵ "Investments for large plant of IG," August 18, 1945; "Investment for new plants of IG from 1933–1944," August 18, 1945, both in Public Record Office, Kew, FO 1031/233.

¹⁸⁶ "Umsätze und Gewinne der BASF seit der Gründung 1865," UA BASF. Percentage increases calculated by the author on the basis of data presented in this document. The figures presented in Dr. Rötger, "Bilanzziffern Ludwigshafen/Oppau im Rahmen der IG Farben," Table IIb, n.d. [ca. 1966], BASF IG, T 01, Geschichte des Verkaufs are higher across the board, but the spectacular rates of increase in turnover that they indicate are similar to those of the BASF core factories in the late 1930s.

¹⁸⁷ Dr. Rötger, "Chemikalien-Umsätze der IG und der BASF," Table 3b, September 23, 1969; Table 3c, "Umsätze der Gruppe 18 b (Kunststoffe) aus BASF-Erzeugung nach Untergruppen 1938 und 1940," n.d. [ca. 1969], both in BASF IG, T 01/1. The two tables differ in their reporting of the percentage of IG revenues accounted for by BASF plastic sales in 1938, although the two agree on the absolute figure and the percentage in 1940. I have included the more likely figure of 74.4 percent for 1938 here.

between 1936 and 1938. More than two-thirds of it per year was spent in the division's traditional center of R&D at Oppau. But Ludwigshafen also fared well during this same period, routinely receiving funds for about one-third of its total R&D outlays in new areas for *Sparte II*, to which it belonged.¹⁸⁸

One of the major organizational innovations in research at Ludwigshafen and Oppau was the resumption in early 1938 of technical direction "conversations," something that corresponded with the appointment of Wurster as overall group leader. These meetings had been suspended at the group in 1930 owing to the new divisional structure of IG Farben. Under Wurster, they recommenced as high-powered affairs, featuring reports on synthetic rubber developments and a host of other R&D activities. The meetings were attended by an equally high-powered group, including Wurster, Ambros, Pier, and Reppe.¹⁸⁹

Matthias Pier, for his part, continued to lead the high-pressure pilot plant, the research findings of which found immediate application in the large number of new hydrogenation facilities in Germany as the war approached. Reporting to the IG Technical Committee in autumn 1942, Pier stressed, among other things, the laboratory's success at increasing yields of aviation fuel from 1936 to 1939. He further emphasized development work on aromatic-hydrocarbon production based on bituminous coal, which was deployed at the Scholven plant. And Pier underscored the potential for hydrogenation processes producing not just fuels but also feedstocks for the chemical industry. Additional work was undertaken on catalysts and on oil refining processes. Much of this research occurred in cooperation – or research findings were shared – with Standard Oil of New Jersey and other American partners.¹⁹⁰

The work in Pier's high-pressure laboratory was carried out by a larger and larger number of individuals, and the funding for the work increased as well. Staff employed at the lab more than doubled between 1932 and 1936, and it more than doubled again in the following years through 1940, to 1,224 in all. Funding for development work also grew substantially.¹⁹¹

¹⁸⁸ Calculated from figures in IG Tea-Büro, "Ausgaben für Versuche auf neuen Gebieten," n.d. (end of May, 1939), BASF IG, C 30/2.

¹⁸⁹ In particular, "1. Technische Direktions-Besprechung in Ludwigshafen am 4. Januar 1938," January 4, 1938, in BASF UA C 13.

¹⁹⁰ Hochdruckversuche Lu 558, "Kurzes Referat des Vortrages von Dr. M. Pier auf der TEA-Sitzung in Frankfurt am 28. Oktober 1942: 'Entwicklung der Methanol-Synthese und der katalytischen Hochdruckhydrierung anschließend an die Ammoniaksynthese bis zum heutigen Stand,'" November 9, 1942, BASF UA, Pier Akten 44; "Gebiete, die in den Hochdruckversuchen 1925–1945 außer der katalytischen Druckhydrierung von Kohlen, Teeren und Oelen bearbeitet wurden," April 29, 1966, BASF UA Pier Akten 53.

¹⁹¹ Hochdruckversuche Lu 558, "TEA-Vortrag: Kosten," October 25, 1942, BASF UA, collection of material for history of the firm A 2.0-A 2.5.

Another familiar figure, Walter Reppe, also continued his research in Ludwigshafen, focusing on synthetic rubber as well as developing a whole new strand of acetylene chemistry, which eventually became known as Reppe chemistry and which remained a promising branch of coal-based chemistry well into the postwar period. Reppe's acetylene chemistry proved particularly valuable in the production of a number of plastics products. He remained the head of the Intermediates and Plastics Laboratory through 1937. Then, as a reward for his work on the three-step process for producing butadiene for synthetic rubber, Reppe was named director of Ludwigshafen's Main Laboratory on January 1, 1938, the same date that Carl Wurster was elevated to group leader at Ludwigshafen-Oppau and to the IG managing board. Reppe would continue to be influential within the core factories into the postwar period, eventually serving as a member of the BASF managing board.¹⁹²

The Ammonia Laboratory also enjoyed significant increases in staff. Total numbers employed at the laboratory grew by about 80 percent between 1936 and 1939. By the beginning of 1940, 1,334 staff members worked in the lab, which was headed as of 1939 by the plant manager of Oppau, Martin Müller-Cunradi, whose own career had started in the laboratory in 1919. Given growing pressures on labor as the economy moved into full preparation for the war, more and more of the staff increases consisted of women. Lab personnel, moreover, worked longer on average from June 1936 onward than they had before. But these quantitative increases were also accompanied by qualitative ones. Instead of doing research that was frequently of basic scientific character and communicated to the scientific public through publication and colloquia, applications-oriented development became the order of the day. This dramatic change in the orientation of lab work resulted in increasing numbers of patents and in know-how that could be transferred immediately to production facilities within the IG, especially within *Sparte I*.¹⁹³

Work, the Workforce, and National Socialist Ideology and Practice

Located in the Rhineland Palatinate, the plants at Ludwigshafen and Oppau had a different situation with regard to workers compared to IG plants elsewhere. Structural unemployment lasted longer in the Palatinate than in

¹⁹² Morris, "Ambros, Reppe," especially p. 115; "1. Technische Direktions-Besprechung in Ludwigshafen am 4. Januar 1938," January 4, 1938, in BASF UA C 13.

¹⁹³ Ammoniaklaboratorium Oppau, "Jahres-Bericht 1939," p. 4, BASF UA D 202/3; E. Wolffhardt, "Geschichte des Ammoniaklaboratoriums während des II. Weltkrieges 1939 bis 1945," p. 129, BASF UA D 201/3; "Versuchsarbeiten in Oppau (Vortrag Müller-Cunradi)," "Niederschrift über die Montagsbesprechung am 14.8.1939 in Frankfurt am Main," August 18, 1939, p. 1, BASF IG, C 30/1.

other German regions, well into 1937. The situation was exacerbated by 1938 when specialist workers began to leave the region because of increasing demand (and therefore potentially better conditions) in other areas.¹⁹⁴ By 1939, the situation was becoming critical, and Carl Wurster announced to a meeting of the directorship at Ludwigshafen in mid-June that the core group factories were suffering a shortfall of approximately 500 workers, requiring three shifts instead of the usual two.¹⁹⁵

The core factories pursued two tacks in addition to requiring longer working hours in order to try to come to terms with the growing shortage of labor. One of the most important was to begin deployment of conscript labor, although initially the workers were German rather than foreign. They were drawn from regions in the Reich where unemployment remained a problem even in the late 1930s, and especially from agricultural areas. Those who arrived in Ludwigshafen-Oppau, for example, came from relatively backward southern Germany, for the most part by way of Württemberg, which is where Ludwigshafen-Oppau *Betriebsführer* Carl Wurster hailed from, and they flowed to the Upper Rhine plants in greater and greater numbers in conjunction with military conscription, which was implemented in late summer 1939. Dramatic labor shortfalls ensued as factory workers moved into the armed forces. It proved necessary to substitute some 4,000 German conscript workers. However, it was not until June 1940 that the first prisoners of war (POWs) were deployed in the factories, and it was late summer 1940 before foreign “guest” workers began arriving at the plants.¹⁹⁶ The use of foreign labor at Ludwigshafen and Oppau and other plants associated with the Upper Rhine group will be investigated in more detail in the next two sections.

In addition to German conscript labor, which was heavily male, the factories tried to offset some of the growing shortage of labor by hiring women. Women had, of course, worked in the factories before the mid-1930s, but their numbers were minuscule, amounting through 1937 to no more than 100 among a total waged workforce of over 15,000. By 1938, there were still only slightly more than 100 women working in Ludwigshafen and Oppau despite the fact that the total waged workforce had grown to over 17,000. With the approach of war, however, the number of female workers increased most dramatically. By 1939, 1,100 women were working in the core Upper

¹⁹⁴ United States Nuremberg War Crimes Trials: United States of America v. Carl Krauch et al. (Case VI), Transcript, vol. 114, testimony of Carl Wurster on April 9, 1948, pp. 10911–12, IWM, London.

¹⁹⁵ IG Farben, Ludwigshafen, “22. Technische Direktions-Besprechung in Ludwigshafen am 13.6.39,” June 13, 1939, BASF UA C 13.

¹⁹⁶ United States Nuremberg War Crimes Trials: United States of America v. Carl Krauch et al. (Case VI), Transcript, vol. 114, testimony of Carl Wurster on April 9, 1948, pp. 10911, 109872–4, IWM, London; Direktionssitzung in Ludwigshafen am Rhein am 28. Juni 1940, p. 2, BASF UA, C 13.

Rhine group factories, and this number rose to 2,600 in 1940. The waged workforce was now more than 10 percent female.¹⁹⁷

Despite these efforts to offset the growing labor shortage in the last years of the 1930s, the escalating crisis was reflected in the relatively modest rise in the workforce at Ludwigshafen and Oppau compared to increases in revenue between 1936 and 1939. The total number of workers at the plants increased by only a handful between 1935 and 1936 even as sales went up by nearly a third. From 1936 to 1939, revenues increased more than two-thirds, whereas the workforce grew just 22 percent.¹⁹⁸ Clearly, these sorts of discrepancies could not be sustained for much longer without affecting output, quality, and safety, especially when military conscription and additional war production demands placed added strains on the system.

But the National Socialist government put even more stress on the labor market through its policies of “Aryanization,” which intensified beginning in January 1938. Anti-Jewish practice was institutionalized through a series of decrees and legislation beginning shortly after Hitler’s seizure of power in 1933, and these measures influenced business practice in the Third Reich. But it was only in 1937–8 that the government introduced more measures that directly affected the conduct of business in this regard. Initially, decrees limited the foreign exchange and raw materials available to Jewish firms, and owners of such firms were often more or less forced to sell off their assets at knockdown prices. Beginning on January 4, 1938, however, Hermann Göring issued a series of decrees defining “Jewish firms” in narrower and narrower terms – by July 1938 even the presence of one Jew on a firm’s supervisory board made it a “Jewish” company – and excluding such businesses from government contracts.¹⁹⁹

There is little evidence that the IG took advantage of these policies to gain the property of dispossessed Jewish owners or to get rid of Jewish employees. Most of the Jews who had been in positions of responsibility at the IG had been relocated to foreign subsidiaries before 1938, although a number remained on the supervisory board, including the Metallgesellschaft’s Richard Merton, who had been appointed to the position as late as 1935. This group of men resigned their positions immediately after Göring’s decrees in January 1938. After the announcement of the even narrower definition of Jewish firms in July, IG Farben was therefore immediately able to apply for, and receive, certification that it was “a German firm” indeed “according

¹⁹⁷ Compiled from table by BASF Personnel Department from VT, “Der Mensch in BASF,” C 621/2; and from contemporary tables in C62205: Sozial Entwicklung. Arbeiterstand 1897–1946. BASF UA.

¹⁹⁸ Figures on workforce compiled and percentage increases calculated from table by BASF Personnel Department, Tetzner, *Der Mensch in BASF*, C 621/2; and from contemporary tables in C62205: Sozial Entwicklung, Arbeiterstand 1897–1946, both from BASF UA.

¹⁹⁹ Hayes, *Industry and Ideology*, p. 170.

to the guidelines that exist to differentiate between non-Jewish and Jewish enterprises.”²⁰⁰

The other side of the coin of National Socialist ideological exclusion of so-called non-Aryans was a stress on inclusion for “Aryans.” Ideology, combined with greater and greater shortages of labor, dictated the establishment of a system of rewards and preferential treatment afforded to “German” workers, in particular through the programs of the DAF. The DAF’s “Strength through Joy” (*Kraft durch Freude, or KdF*) program in particular offered foreign holidays and other aspects of the good life, although the rewards soon fell victim to the exigencies of war once it began in September 1939. Foreign holidays were, however, restricted to a privileged few even before that. In a meeting of the directorship at Ludwigshafen in February 1938, for instance, it was noted that: “thus far relatively little has been done in the area of KdF holidays.” Thus, “the price of a trip to Italy should be made available to 20 factory comrades, 10 each from the Ludwigshafen and Oppau factories. Selection should be made by the *Betriebsführer* in consultation with the social department. Prerequisite: at least 10 years of service.”²⁰¹ Given that the total waged workforce at the two core factories in 1938 amounted to over 17,000, it was a minuscule number who were granted an opportunity to attain “Strength through Joy.”

In sum, two things become clear from this brief overview of labor policy in the last peacetime years of National Socialism. First, attempts to improve the lot of laborers through Labor Front organizations were by and large ineffective. Second, the Labor Front’s monopoly over both labor policy and the constricted labor market indicated the extent to which the group had lost control over this very important aspect of its business.

With the outbreak of war in September 1939, the group and its personnel played an even more important role. But the increased prominence came at a great cost. The formation of the IG, in particular its establishment of a divisional structure by 1930–1, deprived the group of control over sales and financing. The increasing power of the National Socialists deprived it of still further areas of competence, especially the group’s (and the IG’s) exclusive control over production, investment, and labor.

Technology remained the sole area over which the group enjoyed virtually full autonomy, and it is no wonder that, *faute de mieux*, it was seized on as a focal point of group identity. Of course, technological excellence had

²⁰⁰ Hayes, *Industry and Ideology*, pp. 126–7; 197–7; quotation from Industrie- und Handelskammer für das Rhine-Main Wirtschaftsgebiet (Flach) to IG Farbenindustrie AG, “Bestätigung,” August 11, 1938, BASF UA A 865/57.

²⁰¹ “Direktionsitzung in Ludwigshafen am Rhein am 9. Februar 1938,” p. 3, BASF UA, C13. More generally, see the extract from the SPD Deutschland-Berichte of April 1939, in Sax and Kuntz, *Inside Hitler’s Germany*, pp. 297–301.

formed the core of the former BASF groups traditional identity well before the Nazi period, but it was never so one-sided as it became by the late 1930s. The narrowing effects had many downsides, but none was more damaging than the moral dimension, as soon became obvious.

6. THE UPPER RHINE GROUP IN GERMAN-DOMINATED EUROPE, 1939-1942

Despite long preparation, National Socialist Germany was not really ready for war when it attacked Poland on September 1, 1939. Of course, even before the establishment of the Army Liaison Office in 1935, IG Farben had aimed at readiness for its factories in the case of mobilization. But some of these plans were desultory and, in the case of the core Upper Rhine group factories on the Rhine, had met with resistance, especially if they required parts of the factories to be moved to other locations. Construction of many of the synthetic fuel plants that had been started in the last years of peace was still incomplete. And the much vaunted synthetic rubber program, so vital for mobility of the army and its blitzkrieg tactics, had only partially been realized. Production of buna during 1939 was only 22,500 tons, though it rose to more than five times that level by 1943.²⁰²

We know in retrospect that these shortcomings need not have worried German planners and industrialists unduly in the short term. After all, the Wehrmacht and the Luftwaffe made short work of Poland. After the short "phony war" against France and Britain and their allies, Hitler turned west to tackle France and the Low Countries. By early summer 1940, Germany and its Axis partners dominated virtually all of continental western Europe. However, the rapid success of the German military brought with it new problems for German industry, including IG Farben and the Upper Rhine group. Industrialists not only had to expand production but also had to undertake planning for implementing the "New Order" in occupied areas and to develop ideas about postwar Europe. In addition, the outbreak of war and the rapid swelling of German military ranks through conscription pushed an already taut labor market to the breaking point. National Socialist ideology discouraged the use of German female labor, and there were natural limits to the availability of older German men to industrial firms. Therefore, the only way to resolve the problem of labor supply was to gain access to foreign workers, initially through enticements of various sorts and eventually through force. No German producer was immune to this process, and the factories of the Upper Rhine group joined in gradually beginning in 1940.

²⁰² Morris, "The Development of Acetylene Chemistry and Synthetic Rubber," p. 180.

The National Socialist New Order and the Upper Rhine Group

At the beginning of the conflict, the government of the Reich naturally assumed that Ludwigshafen and Oppau, being located so close to the western borders of the Reich, stood in imminent danger of attack. For that reason, and because the Rhine-based plants of the Upper Rhine group produced such important goods for the war effort, there were plans to move crucial war materials out of harm's way. Wirtschaftsforschung GmbH, or Wifo, the organization responsible for stockpiling items necessary for the prosecution of the war, insisted that Ludwigshafen and Oppau accumulate and store some raw materials in the factories to ensure continuous production in case of bombing or transport disruption. The bulk of these raw materials, however, would be warehoused more safely in the Ruhr district (which Air Force Minister Hermann Göring had promised would be safe from Allied bombing) and elsewhere. Key finished goods, such as urea, kaurit industrial glue, and catalysts, would have to be moved off-site quickly as well. These measures all cost money. The core group factories complained in 1940 that they had paid out RM 1.7 million, of which at that point "not a single pfenning had been received in compensation." By late 1942, however, the IG had successfully negotiated a full-fledged compensation scheme with the government.²⁰³

Well before that time, though, rapid German victory in the west altered the strategic situation, and in summer 1940 the directors of the core plants decided that "relocation of stockpiles and production [appears]...no longer purposeful." Stockpiling of some vital materials would have to continue in the interests of the war economy, of course, but it was now to be done "on the basis of economic criteria to the extent possible." Thus, between mid-1940 until 1943, Ludwigshafen and Oppau were largely able to produce without the need for remote stockpiling.²⁰⁴

The one fly in the ointment, however, was the swift arrival of Allied bombers by mid-1940, which hit not only the core group factories but also the Ruhr district, the latter despite Göring's promises. Raids in June and December did minor damage to the Rhine-based plants of the Upper Rhine group and to their stocks and equipment. Isolated attacks in May, August, and October 1941 and during 1942 were no worse, mainly because the

²⁰³ "Geschichte des Direktionsbüros der Sparte I," July 30, 1943, p. 10, BASF IG, A 251/1; IG Farben Ludwigshafen, Direktionsabteilung, "Aktennotiz betr. Auslagerung," November 4, 1939; IG Farben, Vermittlungsstelle W (Diekmann), "Aktenvermerk Betr. Vergütung von Umlagerungskosten," December 4, 1939; Reichswirtschaftsministerium II Chem to IG Farben Berlin NW 7, August 2, 1940; all in BASF IG, A 865/55. Quotation from "Direktionssitzung Ludwigshafen," June 28, 1940, p. 2, BASF UA C13.

²⁰⁴ Quotations from "Direktionssitzung Ludwigshafen," June 28, 1940, p. 2, BASF UA C13; "Geschichte des Direktionsbüros der Sparte I," July 30, 1943, p. 10, BASF IG, A 251/1.

plants themselves were not yet a primary Allied target. Instead, the targets of the bombing in those years were the nearby cities of Ludwigshafen and Mannheim. Moreover, the costs of damages from bombing declined during the first half of the war. In 1940, Ludwigshafen submitted to the Reich claims of just over RM 1 million for compensation for bombing and flak damages; by 1942, this sum dropped to just under RM 690,000. Oppau, further removed from the city centers of both Ludwigshafen and Mannheim, was luckier. Its claims amounted to RM 269,920 in 1940 and just over RM 80,000 in 1942.²⁰⁵

With bombing only a small irritation, thoughts could turn to other matters, including the fate of the occupied territories. Even before the apparent end of the war in the west, moves were made to assess the contribution that firms in conquered areas might make to the German war economy – and to IG Farben. Less than two months after the attack on Poland, for instance, Ludwigshafen's Carl Wurster was given the task of touring occupied Poland. Accompanied by a representative of the Reich Office of Economic Expansion, a chemist from Hoechst who served as an interpreter, and a chauffeur from Ludwigshafen, Wurster toured the area in a 2.9 liter Mercedes in late October and early November 1939. The objective of the visit was to examine a number of Polish chemical plants quickly to evaluate their suitability for dismantlement and removal to the Reich, though some installations were to be allowed to continue working in situ to support the German war effort.²⁰⁶ In autumn 1939, Wurster's trip was one of many that senior IG managers undertook to the conquered territory in what used to be Poland in order to determine the region's usefulness for plans to expand military and commercial production.

Careful inspection of the spoils of victory continued as German armies rolled triumphantly westward in summer 1940. Not long after the apparent victory in the west, IG Farben submitted a comprehensive overview of the "possible organization of the European economic area" to the Reich Ministry of Economics. The purpose was to aid in planning but also to explore "the degree to which we have special suggestions to bring forward and wishes that apply to our firm." The document, prepared at IG's Berlin "NW7" policy and government liaison offices (which were named after the postcode in which they were located), was forwarded to various other governmental officials as well, including the envoy to the German armistice delegation responsible for economic negotiations with defeated France. There were two parts to the overview, one dealing with the general shape of the

²⁰⁵ U.S. Strategic Bombing Survey, Oil Division, "Ludwigshafen-Oppau Works of IG Farbenindustrie AG, Ludwigshafen, Germany," 2nd ed., January 1947, pp. 55–6.

²⁰⁶ Wurster to Director Buerger, November 23, 1939. "Report on the inspection of some chemical industrial plants in Poland between October 26 and November 1, 1939," Draft, NI-1149, IWM, London.

European chemical industry under the new German order; the other, specifically with background for German policy toward France. The letter closed with a promise of additional detailed comments on Holland in the near future.²⁰⁷

The general examination of the shape of the European chemical industry started from the premise that the period from World War I through 1940 was characterized by growing competition from foreign chemical firms, mostly supported by their governments, and a corresponding decline in Germany's once preeminent position. Although a return to the status quo before 1914 was admitted to be impossible, it was proposed, "in the process of planning a large-scale European trading area, to accord the German chemical industry again a leading role commensurate with its technical, economic, and scientific rank."²⁰⁸ Such thinking represented a major shift for many in the IG, as Peter Hayes has underscored: "This design for a European bloc signaled [the] IG's conversion from economic liberalism to the neomercantilism long advanced by Nazi economists."²⁰⁹ Be that as it may, parts of the IG had long since rejected free trade in practice. In particular, the factories of *Sparte I*, dominated by the Upper Rhine group, had been heavily oriented to protectionism and the domestic market since at least the Depression. Through 1945 and even well into the 1950s, the concern and its components never seriously considered using anything but domestic coal as their key feedstock.

In any case, it is not the place here to detail the plans, negotiations, and actions of the IG in the German New Order after mid-1940. They were, after all, the work of the IG as a whole, as interpreted by Berlin NW7, rather than that of the Upper Rhine group or any other particular group in the IG.²¹⁰ For two reasons, only the French case is explored here. First, the location of the core group factories close to the French border meant that they had a particular interest in what happened there. Second, the actions of the French occupiers in Ludwigshafen and Oppau after 1945 are largely explicable only in light of what happened during the war.

The assumptions and principles outlined in the general part of the NW7 memo of August 1940 were applied in a separate commentary on France. The defeated country, the IG suggested, should retain a substantial chemical industry, especially because it posed no real threat to most German exports

²⁰⁷ Von Schnitzler and Krüger to Schlotterer (Reich Economics Ministry), August 3, 1940, plus attachments, BASF IG, A 865/3.

²⁰⁸ "Denkschrift," "Allgemeiner Teil," August 3, 1940, especially pp. 9–10, quotation p. 10, BASF IG, A 865/3.

²⁰⁹ Hayes, *Industry and Ideology*, p. 270.

²¹⁰ For a thorough consideration of the IG's New Order plans and their implementation in various occupied countries, see Hayes, *Industry and Ideology*, pp. 266–317.

markets. But trade barriers erected against German chemicals should be dismantled, and other alleged past injustices should be undone. In a detailed historical section, the report argued that the French had treated Germany badly since World War I, and though some concessions were made to the Germans in the late 1920s, “the double injustice of 1918 and 1923–4 has never been made up for.” Indeed, through the seizure of patents and processes during and after the war, the French chemical industry had managed to turn formerly lucrative French markets for German dyes and pharmaceuticals into French-dominated ones. Implicitly, then, German policy should be directed at rectifying this situation.²¹¹

The specific proposals that the IG put forward to reorganize the French chemical industry under German dominance reflected the firm’s general practice of not so much swallowing a foreign chemical industry as “subordinat[ing] it to the firm’s postwar plans.” By and large, takeovers were shunned. Instead, the IG pursued “plant shutdowns, long-term market sharing agreements, export prohibitions,” and other, more indirect measures for ensuring its predominance. There was, though, a special axe to grind in France because of what the IG perceived as the post-World War I rapacity of the French. In negotiations with the French, which were conducted in conjunction with governmental authorities, the IG therefore proposed the formation in France of a national dyestuffs company, 51 percent of which was to be owned by the German chemical giant. The French resisted this suggestion but, bowing to a combination of threats and political pressure, agreed in March 1941 to a slightly revised arrangement. The IG would gain control of 51 percent of the new firm, Francolor SA, but its president would be French. Each nationality would be guaranteed half the seats of the new firm’s directorship.²¹² The new enterprise played a crucial role in the wartime period. By early 1942, shortages of workers in Germany led IG Farben to suggest that some of its less security-sensitive production for the army be relocated to Francolor plants.²¹³ This realignment of the French dyestuffs industry was paralleled by revisions to the organization of the French pharmaceutical industry, again to the benefit of the IG.

In two quite divergent ways the conglomerate’s actions in France would color the views of the French postwar occupation authorities responsible for BASF after 1945. Naturally, the well-founded belief that the Germans had tried to exploit the political and military situation after June 1940 to their commercial benefit instilled some French animosity and desire for revenge.

²¹¹ “Denkschrift Frankreich,” August 3, 1940, quotation p. 10, BASF UA, A 865/3.

²¹² Hayes, *Industry and Ideology*, pp. 278–90, quotations p. 278.

²¹³ Militärbefehlshaber in Frankreich, Verwaltungsstab, Wirtschaftsabteilung to Reich Economics Ministry (Mulert), “Betreff: Chemische Industrie Frankreichs,” February 13, 1942, BAL, R7/2256.

On the other hand, the fact that many French chemists, engineers, and managers worked with or under their German counterparts established personal connections – and even mutual respect – that also played a role in the French occupation.

Meanwhile, German postwar planning was already well advanced by 1940 and 1941, but the continuation and eventual intensification of the war ensured that the Upper Rhine group remained extremely busy designing, building, and commissioning new plants, albeit at home more than abroad. In fact, the group's foreign markets for engineering virtually collapsed. Thus, its earlier activities in Japan ended abruptly in 1939 for the most part with the outbreak of the war in Europe, though some plant components and a number of technical drawings were delivered for some Japanese projects on the basis of contracts signed as late as November 1940. The outbreak of war with Russia, however, brought even this minimal involvement with the Japanese to a close. A contract with Argentina for a small nitrogen plant for explosives production also fell victim to the war and was formally suspended in August 1942. The group managed, however, to draw up plans and oversee construction for all or most of four plants in Spain, two for ammonia and one each for methanol and formaldehyde. Constructed from 1942 through 1944, these facilities were the last of the group's foreign adventures until after the war.²¹⁴

Closer to home, however, the group's activities in the area of plant engineering actually intensified. Four more hydrogenation plants based on the process used in the IG's *Sparte I* were constructed and came on-line between 1940 and 1943: the Lützkendorf plant in central Germany, one in Wesseling near Cologne, one in Brüx in the Sudetenland, and one in Blechhammer in Upper Silesia. The Wesseling facility continued the tradition of using brown coal as a raw material, but the Lützkendorf and Blechhammer factories allowed the extension of the bituminous-coal technology that Pier found most promising. The hydrogenation plant in the Sudetenland used tar. Once again, scientists, engineers, and managers from the Upper Rhine group were heavily involved in these projects, contributing personnel, apparatus, and know-how. Total capacity of the four facilities by the beginning of 1944 amounted to well over 1 million tons.²¹⁵ As more and more facilities began operation in the Reich, royalty income to the IG increased substantially. Royalty payments came to just under RM 4 million in 1939 and rose to RM

²¹⁴ "Von der BASF in Deutschland und im Ausland gebaute Anlagen," Bl. 2, n.d. [ca. 1962], BASF IG, R 01/1; "Geschichte des Direktionsbüros der Sparte I," July 30, 1943, pp. 11–13, BASF IG, A 251/1.

²¹⁵ "Von der BASF in Deutschland und im Ausland gebaute Anlagen," Bl. 2, 7, n.d. [ca. 1962], BASF IG, R 01/1; Stranges, "Germany's synthetic fuel industry, 1927–1945," Tables 1 and 2.

5.2 million in 1941. By 1942, however, this amount had more than doubled, to RM 13.8 million.²¹⁶

Even more than had been the case in the Third Reich's last peacetime years, though, the group's attention during the first years of the war was focused on designing, building, equipping, and operating three new buna rubber plants. The Hüls facility in the Ruhr district, which used waste gases from the nearby Scholven hydrogenation plant to produce rubber, ethylene oxide, and ethylene oxide derivatives, was completed by 1940, and pressure for a third buna plant had been exerted by the state as early as 1937. Initially, three separate sites – in central Germany, in Upper Silesia, and in the Sudetenland – had been considered for Buna III but had been ruled out even before the outbreak of the war, mainly because of disputes about costs and shortages of technicians and scientists. The beginning of the conflict made expansion of buna production capacity more pressing, however, and a site at Rattwitz, south of Breslau, was suggested. Work was even begun in early 1940 to prepare the site for building. Again, though, shortages of both expert manpower and building materials, along with the apparent German victory, led to its abandonment by the summer.

When the war continued into late 1940 without victory over Britain, the government renewed pressure on the IG to build a new buna plant to raise production further. The costs and urgency of such a project made it appear more sensible to expand an existing IG plant. An additional factor in this viewpoint was the wish of Otto Ambros to finally build a plant that would use Walter Reppe's new three-stage process rather than the now more traditional four-stage one. One member of the IG managing board, Hans Kühne, who was active in the Bayer group, suggested Leverkusen as a possible site. Ambros, however, rejected it in favor of Ludwigshafen. Given the Allied bombing raids already launched against that area in 1940, military planners objected to the idea of siting the new plant within such easy reach of the enemy. But they relented in August 1940 in the face of the concern's recalcitrance, its promise that Buna III would be constructed quickly, and its assurances the Buna IV, the last and largest of the buna plants, would be located to the east, out of range of Allied bombers.²¹⁷

The exact location of that final plant was undetermined at this point, though a number of sites were already under active consideration. Within

²¹⁶ Hochdruckversuche Lu 558, "TEA-Vortrag: Kosten," October 25, 1942, p. 3, BASF UA, A 2.0-A 2.5, collection of material for history of the firm; "Kosten der Hydrierung," June 30, 1947, BASF UA, Pier Akten 49.

²¹⁷ Ernst Struss, Affidavits, "On the founding of the Buna Works of the IG," June 9, 1947; "Auschwitz," June 9, 1945, both NI-7241, IWM, London; Morris, "The development of acetylene chemistry and synthetic rubber," pp. 304-30; Hayes, *Industry and Ideology*, 348.

a remarkably short time, however, the IG made its fateful decision – and detailed planning commenced for a large factory to be built near Auschwitz.

Through the work of Peter Hayes and Peter Morris, supplemented by more recent and more detailed studies by a variety of historians, including Karl-Heinz Roth, Florian Schmaltz, and, especially, Bernd Wagner, the story of the IG's establishment of the Auschwitz plant is now well known, though some of the key details remain controversial.²¹⁸ As just noted, the agreement to build Buna III at Ludwigshafen was accepted by the government and military only if IG Farben began immediate plans to construct a fourth facility far beyond the reach of Allied bombers. After negotiations between the firm and governmental officials, the general consensus emerged by early November 1940 that Buna IV would be in Upper Silesia. In anticipation of general expansion of chemical production capacity in this province, and in direct response to the trips undertaken by senior IG managers to the area in late 1939 and early 1940, the IG had already begun negotiations by summer 1940 to acquire coal reserves there for providing raw materials to potential production plants.²¹⁹ By February 8, 1941 this planning had led to the concern's acquisition of a 51 percent stake in the Fürstengrube coal mine, which, along with another mine acquired later, was to supply the Auschwitz plant with its most important raw material.

For much of the time that these negotiations to guarantee coal supplies proceeded, however, the final decision on the factory's location remained up in the air. By late autumn, 1940, a few sites were under active consideration, among them Rattwitz and Auschwitz.²²⁰ Although the latter had good transportation links, proximity to raw materials, and plenty of water, it seemed the least promising at first, mainly because of its marshy terrain. Rattwitz, on the other hand, had been prepared in early 1940 as a potential Buna III site and was therefore already well known. Its weaknesses were known, too, however, and it was soon eliminated from further consideration. The person responsible for the buna program, Otto Ambros, visited most of the remaining potential sites in December to assess their suitability. Each was disqualified in turn, leaving only Auschwitz, despite its drawbacks.

²¹⁸ Morris, "The development of acetylene chemistry and synthetic rubber," pp. 330–43; Hayes, *Industry and Ideology*, pp. 347–53; Roth, "IG Auschwitz," pp. 11–28; Schmaltz and Roth, "Neue Dokumente"; Schmaltz, "Die Entstehung"; Wagner, "IG Auschwitz." See also the discussion in *Geschichte und Gesellschaft* in the early 1990s, Hayes, "Zur umstrittenen Geschichte der IG Farbenindustrie"; Plumpe, "Antwort auf Peter Hayes"; Sandkühler and Schmuhl, "Noch einmal: Die IG Farben und Auschwitz." See also White, "Target Auschwitz" and the literature cited there.

²¹⁹ Testimony of Dr. Falkenhahn, November 25, 1947, United States Nuremberg War Crimes Trials: United States of America v. Carl Krauch et al. (Case VI), p. 4398, BASF UA.

²²⁰ Morris, "The development of acetylene chemistry and synthetic rubber," p. 308a; Wagner, in "IG Auschwitz," pp. 59–62, in contrast, claims that Rattwitz was the preferred site through December 1940.

This area's chances for selection were enhanced by two developments. First, a drier location had recently been found near the town of Auschwitz, at Monowitz. Second, the suitability of this new site was rated very positively in a report dated January 10, 1941 and submitted by Mineralölbau GmbH, the organization that received governmental funds for construction of synthetic oil and rubber plants on IG's behalf. With Monowitz the only serious remaining alternative for the new plant, Ambros set off to examine it personally for four days at the beginning of February 1941. He ultimately determined that the physical site, communications, raw materials, and water for the proposed location were all satisfactory. Though the question of sufficient labor was still unclear, he decided on his return to Germany to meet with his superior, Fritz ter Meer, and with Carl Krauch, representing the government, to lobby for constructing Buna IV near Auschwitz.

Two days after arriving back from his visit to Monowitz, on February 6, Ambros presented his case to the two men, and all three agreed to move forward with the plan. By February 18, Göring issued a directive to this effect. Detailed planning began in Ludwigshafen at a meeting chaired by Ambros on March 24, 1941.

We will come back to the latter meeting shortly, for it has clear implications for assessing the role of the Upper Rhine group in the IG Auschwitz-Monowitz project. It is important first to review the timing of the decision to locate Buna IV at Monowitz and the question of the plant's labor supply. As contemporary documentary evidence and the findings of most scholars clearly show, the final decision to locate the buna plant at Monowitz was made in February 1941. But such crucial decisions are based only on long investigation and preparation, and scholars such as Hayes, Morris, and Wagner all agree that the Auschwitz area in general had been selected as a potential site by autumn 1940. They also agree that Monowitz had been identified by November of that year. More recently, Schmaltz and Roth have turned up a document dated December 4, 1939 that indicates that Auschwitz-Monowitz had already been identified as a site for a major chemical production facility, one that would produce not just buna, but also nitrogen, synthetic gasoline, and a number of other products.²²¹

Although they and other scholars have been unable to unearth documentary evidence of any further consideration of the site until autumn 1940, it is altogether possible, even likely, that Auschwitz was well known to, and generally viewed positively by, IG planners as early as November–December 1939. After all, many senior managers and technical personnel had visited the area early in the war, and the IG had already set about trying to acquire coal reserves in nearby Fürstengrube by spring or summer 1940. Furthermore, it is entirely in keeping with the practice of chemical (and other

²²¹ Schmaltz and Roth, "Neue Dokumente," pp. 100–16; Schmaltz, "Die Entstehung."

industrial) firms to consider simultaneously a large number of potential sites for expansion or consolidation of production. Finally, it is also clear from the Auschwitz-related discussion within the IG and from the time at which detailed planning for the plant started in March 1941 that many people (not least Ambros) had long favored a new, large facility that would integrate all of the IG's most advanced production processes at a single site and serve as a commercially viable facility after German victory in the war. They saw Auschwitz-Monowitz as an opportunity to realize this dream.

Still, all this background does not necessarily lend support to Schmaltz and Roth's contention that the Auschwitz site had been firmly identified already in late 1939 as the place where these plans would be realized. They contend that the main document on which their article represents a "long-term decision in favor of a certain site" for the IG and that this decision committed the concern unswervingly and unerringly to a certain course until construction finally started during 1941.²²² This assertion is implausible for reasons discussed later. Moreover, the authors provide no evidence whatsoever to support their argument that the IG concealed its prospective postwar commercial intentions from the government from late 1939 until autumn 1940, biding its time and maneuvering until it could convince the regime to finance the facility.

There are in fact a number of reasons why the more conventional dating of events should be retained, though modified slightly to recognize the probable earlier, yet very general, positive consideration of Auschwitz as a potential site. First, it is important to keep in mind that there is a very long and complex path between a firm's first flickers of interest in a potential site and the actual construction of a plant. As already seen with regard to the other buna facilities, a large number of potential construction sites are considered, but few are ultimately chosen. This procedure is common in many industries, and the chemical sector is no exception. If Schmaltz and Roth are correct that the ultimate decision in favor of Auschwitz had already been made in December 1939, then the first flickers of interest would have to be dated much earlier. But there is absolutely no evidence that such interest ever existed before late 1939. Indeed, such evidence is inherently unlikely. The war had started only a few months earlier, and the area did not come under serious consideration for industrial expansion until after the German victory.

Second, the interpretation by Schmaltz and Roth contradicts some of the well-known evidence. For instance, if Auschwitz had already been identified as *the* site for expansion of the firm in late 1939, why did the IG begin preparations for building Buna III in Rattwitz in early 1940? If the firm was firmly and unswervingly committed to Auschwitz as early as these two authors believe it was, why had its managers not yet identified a definite site

²²² Schmaltz and Roth, "Neue Dokumente," p. 112.

for the plant? After all, even Schmaltz and Roth admit that the suitable construction site at Monowitz was not found until November 1940. Obviously, the identification and positive vetting of Monowitz sealed the decision to build a plant near Auschwitz, not the reverse. This realization accords well with the more traditional version of events.

Finally, although it is highly probable that Ambros and others from the Upper Rhine group were, from at least the early 1940s, taken with the general idea of (re-)integrating the group's technologies and capabilities in a single facility, there is no evidence until the early months of 1941 that they thought this dream might come to fruition in Auschwitz-Monowitz.

Much of what has been written about the facility, whether popular or scholarly, whether written shortly after the war or long after it, has focused on a different, related, and perhaps more important issue associated with the establishment of an IG plant at Auschwitz. To what extent did the potential availability of inmates from the death camp at Auschwitz as workers for the plant's construction and operation determine the IG's decision to build a facility at Monowitz? Answering this question is essential for gauging precisely the extent to which IG Farben managers should be held accountable for the crimes of the Third Reich. On the face of it, the popular conception that the decision to locate at Monowitz revolved around the existence of this pool of labor has much to recommend it. After all, one of the key problems that plagued the IG and other German firms from even before the war's outbreak was the supply of labor, so it would be natural for the existence of a large supply of workers to figure in their decision.²²³ This reasoning is given added credence by the close links that Otto Ambros and Leuna's Heinrich Bütefisch are alleged to have had with SS leader Heinrich Himmler. Ambros, after all, is said to have been a school chum of the SS leader, and Bütefisch was a member of Himmler's "Circle of Friends."²²⁴

This view, though, contradicts some well-documented facts about the camp's history. The concentration camp at Auschwitz was relatively small when the decision was made for the IG to locate its buna plant there, and it was a transit camp rather than a death camp at that time. The massive influx of Jewish inmates did not occur until much later, coming even after construction had begun. True, there was undoubtedly some prior knowledge of the SS plans to expand the camp, but the precise way in which that would occur was not likely to have been known. Labor supply was indeed on the minds of IG executives, but communications and raw materials supplies carried the most weight in their decision to establish a plant at Auschwitz- Monowitz. Moreover, they were not initially thinking of forced labor. Instead, they were rather convinced that it would be possible to construct the plant by using local civilian labor along with some German settlers.

²²³ Borkin, in *Crime and Punishment*, p. 147, follows this interpretation.

²²⁴ Schmaltz and Roth, "Neue Dokumente," p. 115.

Knowing that those locals were eventually to be “relocated” elsewhere, the IG’s decision-makers took the longer term plans for actually running the facility and based them on the possibility of attracting more German nationals to the area. This approach was in keeping with their plans for a large and complex chemical plant. As Bernd Wagner has put it: “the IG managing board did not decide in favor of Auschwitz[-Monowitz] because it would be possible to use inmates as forced laborers. It chose Auschwitz because this location, among other things, also seemed to have a sufficient labor force available.”²²⁵

Detailed planning of the plant began in Ludwigshafen at a meeting on March 24, 1941. Its venue reveals the dominance of the Rhine-based factory in planning, constructing, and managing Monowitz. Chaired by Otto Ambros, the meeting brought together a number of key figures from Ludwigshafen and Leuna, who would oversee the construction of facility and what turned out to be its limited operation. Among those in attendance were Camill Santo, the head of Ludwigshafen’s construction division (*Bauabteilung*), Ernst Mach, the head of the construction office (*Konstruktionsbüro*), and Walter Dürrfeld, from the Leuna works, who was to become the deputy plant manager of Auschwitz. Ambros, along with Heinrich Bütefisch from Leuna, were the IG managing board members responsible for the project, and Ambros was designated overall plant manager. Dürrfeld eventually assumed this title, though he actually saw to the construction and limited operation of the plant on a day-to-day basis from the beginning.²²⁶

What is clear from the minutes of the meeting is that the project’s realization was seen from the outset as an enormous challenge. But it was also viewed as a rare and welcome opportunity for constructing a modern, integrated facility to exploit fully the technological capabilities of the Upper Rhine group. It represented “the starting shot for a new cooperation of different parts of the firm, including fuel synthesis (the central development of which was located at Leuna) and Buna (Ludwigshafen).”²²⁷ Establishing a plant that would unite these two technologies required supplies of various other chemicals and intermediates, and the factory’s great remove from other IG facilities necessitated that they also be produced on-site. The project represented, then, an unprecedented technological challenge and opportunity for the group.

²²⁵ Wagner, “IG Auschwitz,” pp. 72–3.

²²⁶ “Erste Baubesprechung Auschwitz in Ludwigshafen,” March 24, 1941, NI-11115. Additional documentation of construction planning for Auschwitz is contained in RG 11.001M.03, Reel 71, *Zentralbauleitung der SS in Auschwitz* (Osobyifond #502), USHMM, Washington, DC. The material includes camp diagrams, contracts with subcontractors, resource maps, photographs of the construction site and plant, and minutes of additional meetings involving staff from Ludwigshafen and Leuna.

²²⁷ Wagner, “IG Auschwitz,” p. 80.

Moreover, the Monowitz project presented an opportunity for the Upper Rhine group to reverse the trend that had been apparent within the IG at least since the establishment of the *Sparten* – the splintering of control over its affairs. The group's identity had remained strong, but by the late 1930s this strength had relied primarily on the common sense of purpose and identity of its technical personnel. The Auschwitz plant seemed to offer a chance to reestablish and cement the technological capabilities of the group in a single production facility. This thought was expressed perhaps most succinctly in a rhyme presented to participants at the “unofficial part” of the IG technical committee (TEA) meeting at Leuna on May 26, 1941 to celebrate the 25th anniversary of the factory's founding: IG Auschwitz was conceived by

“Four souls who shared a single vision,
Here fell the final *Sparte* division!”

[*Vier Seelen und nur ein Gedanke,*
Hier fiel die letzte Spartenschanke!]²²⁸

But the decision to site the buna plant at Auschwitz had other significant ramifications as well. Beyond this aim of reintegrating the group, Ambros and others explicitly viewed Auschwitz- Monowitz as a project having ideological and racial significance. Ambros himself characterized it at the beginning of 1942 as a “bulwark of Germandom,” and a “nucleus for the expansion of the *Volk* in the reconquered East.”²²⁹

But before such grand aims could be realized, more basic groundwork had to be laid. At the inaugural meeting on March 24, Ambros therefore set up a small committee consisting of Santo, Mach, and Dürrfeld to begin basic planning for the facility immediately. Ambros also insisted on a division of responsibility for the plant: Construction of the buna works was to be directed from Ludwigshafen; the erection of the hydrogenation plant, from Leuna. But “the full planning of the Auschwitz factory, and thus the combination of a buna factory with a synthetic oil plant, lies at present in Ludwigshafen, specifically with Santo, Duerrfeld, and Mach.”²³⁰ The trio faced a remarkably short deadline for producing those basic plans: just one week, April 1, 1941, the date of the second construction meeting.²³¹ On this groundwork, the official founding of the Auschwitz works took place in Kattowitz on April 7, 1941.²³²

²²⁸ “TEA-Sitzung Leuna am 26 May 1941, inoffizieller Teil,” BASF UA, A 18/24.

²²⁹ Quoted in Wagner, “IG Auschwitz,” pp. 99–100.

²³⁰ “Erste Baubesprechung Auschwitz in Ludwigshafen,” March 24, 1941, NI-11115, quotation p. 59.

²³¹ “Zweite Baubesprechung am 1.4.1941 in Ludwigshafen,” NI-11116.

²³² “Zur Gründung des Werkes Auschwitz. Niederschrift über die Gründungssitzung am 7. April 1941 in Kattowitz,” NI-11117.

Although there was considerable excitement about the technological challenges and opportunities presented by the new plant, it soon became clear that the logistical and other problems were far greater than anyone could have imagined. Despite the project's high priority when it came to procuring materials, they were very difficult to get. Even if the proper materials were obtained, they often could not be transported to the factory. The situation deteriorated still further during summer 1941 after the German invasion of the Soviet Union and the subsequent escalation of the war. The unrelieved lack of sufficient electric power only exacerbated this predicament, with power shortages holding back construction work. It also proved impossible to attract sufficient numbers of skilled ethnic German workers, not least because the high-quality, spacious housing that the IG hoped to construct fell victim to the general materials shortage.

Since the expected additional German workforce failed to materialize, those responsible for the plant's construction turned elsewhere for their massive labor requirements. Thus, the bulk of the workforce for building the new facility came from the Auschwitz concentration camp, which was expanded partly to accomplish Nazi ideological aims and partly to supply workers for the IG factory. The IG factory, in turn, helped facilitate the expansion of the concentration camp by providing the SS with building materials in exchange for laborers.

From the beginning, the conditions faced by inmates at the camp were appalling, and they worsened over time. Insufficient rations, substandard housing, and the malarial conditions of the place led, among other things, to increased incidence of disease. Compounding the situation still further was the fact that the concentration camp lay several miles from the building site. Initially, inmates were woken at 3 a.m. and, after a meager breakfast, forced to make their way on foot to the site, a journey of one and one-half hours. They started work at 5 a.m. and worked hard for the next 12 hours with no more than a short break for thin soup. After this long and arduous day, they had to make their way back to the camp. Given this regimen and the already weakened physical state of the inmates, it was small wonder that they frequently fell ill. Many were literally worked to death.

War Production and Investment

Unlike the immediate prewar period or any of the previous periods examined in this section, the years from 1939 to 1945 saw no major organizational changes for either the Upper Rhine group or the IG conglomerate as a whole. The IG organizational chart was not altered substantially after 1938, and the managing board of the giant firm also remained remarkably stable. The key managers at Ludwigshafen and Oppau – Carl Wurster, Otto Ambros, and Martin Müller-Cunradi – and the structures they developed

also remained in place through the end of the conflict. The one change was that Müller-Cunradi's standing within the broader IG as a whole was confirmed when he was formally named a full-fledged member of the concern's managing board in 1943. But this promotion merely recognized a function that he was already carrying out.

Still, the period from 1939 to 1941 saw important changes in the personnel and management style at the very top of the concern. Carl Krauch left the IG managing board in 1938 in recognition of the fact that his governmental duties were absorbing his energies, and his place as director of the IG's *Sparte I* was filled by another man from the BASF stable, Christian Schneider. Schneider, who had started his career in the factories at Ludwigshafen-Oppau, had moved to become head of the Leuna works and had also assumed the post of the chief of all of the plant managers (*Hauptbetriebsführer*) of all the IG production units.

One of the most important breaks with the past during this period was the death of Carl Bosch in 1940. Bosch's power and influence had been waning for a long time, the result of age, increasing alienation from the National Socialist regime, and the physical decline related to his descent into depression and alcoholism. But almost to the end of his life, in his capacity as head of the IG supervisory board, he remained a very real presence within the trust. Bosch influenced the concern's direction and policies by making use of his perquisite as chairman of the supervisory board to participate in meetings of the managing board and its Central Committee, involvement that stopped only shortly before he died. His passing symbolized the end of an era within the IG, and his place was taken by Carl Krauch. Krauch, whose governmental duties were still growing, was a much more hands-off chairman of the supervisory board, and the managing board now was left for the most part to its own devices in general policy making as well as in day-to-day operation and direction of the conglomerate.²³³

Organizational relationships within the IG underwent one other important change, one associated with a combination of these developments, National Socialist policy, and the outbreak of the war. By the late 1930s, *Sparte II*, particularly the buna program, had eclipsed *Sparte I* as the most powerful division within the IG.²³⁴ However, the impact that this altered power relationship had on the Upper Rhine group, which still dominated *Sparte I*, was complex. After all, Fritz ter Meer from the Bayer group headed up *Sparte II*, but his main deputy, the man responsible for overseeing and developing the buna program, was Ludwigshafen's own Otto Ambros.

²³³ Max Ilgner, "Arbeitsteilung und Verantwortung der IG Vorstandsmitglieder und Direktoren," April 14, 1946, BASF IG, C 10/2. [Photocopy of Akte 201: Vorstand IG aus Nachlass Struss. Orig. in Archiv Farbwerke Hoechst.]

²³⁴ Hayes, *Industry and Ideology*, p. 156.

Ludwigshafen continued to be very important and powerful by virtue of its design and construction capabilities, especially with regard to the buna program. Furthermore, Ambros and other senior members of the group appear to have seen the expansion of the synthetic rubber program through the early 1940s as an opportunity to redefine the Upper Rhine group through integration and further development of its extensive technological capabilities.

The war ushered in other changes as well, ones that affected the group's production and sales. They included a tightening of the labor market, shortages of raw materials, and markets in which priorities were skewed to military requirements and in which foreign sales declined markedly. Still, the war's immediate impact on the production and turnover of the core group factories was relatively benign, even positive, not least because their importance in supplying goods vital to the war effort was clear and growing.

Accordingly, investment in large plants for the factories of the Upper Rhine group outstripped those for other IG groups also during the early war years. Because of the nature of the available statistics on such expenditure (they cover the years from 1937 through 1940 and 1941 through 1944, respectively), this growth is explored in greater detail in the next section. Between 1937 and 1940, however, the investment in the Upper Rhine group's core plants located on the Rhine River was more than three times that in each of the other central factories of IG works groups at Leverkusen or Hoechst, and more than six times the amount they received between 1941 and 1944. Leuna, Schkopau, Hüls, Heydebreck, and Auschwitz, all closely associated with the BASF group, accounted for virtually all of the conglomerate's other major investments from 1941 through 1944. Oppau, and especially Leuna, were each singled out in the early war years for particularly large infusions of funds for new plans. Ludwigshafen also managed to obtain a fairly large level of investment through the Buna III project.²³⁵

In line with this wave of investment funds, total revenue for the group's core factories on the Rhine River increased by 42 percent between 1939 and 1942, from RM 468.5 million to RM 666.4 million. Production and sales of traditional goods, such as nitrogen, various inorganic products, acids, organic chemicals, and dyes continued to account for most of this volume. But high-end products vital to the war economy for specialized military uses and as substitutes were especially strong contributors to the increases. Plastics, for instance, accounted for just 1.5 percent of the group's total sales in 1938, but this figure rose to 5.4 percent in 1940 and to 6.8 percent

²³⁵ "Investments for large plant of IG," August 18, 1945, Public Record Office, Kew, FO 1031/233; "Neuanlagen Merseburg," n.d. (spring 1941); "Neuanlagen Oppau," n.d. (spring 1941); both in BASF IG, A 251/3.

in 1942. Oppau's plastics and plastics-related production increased nearly fivefold from 1939 to 1942, and its manufacture of waxes and raw materials for cleaning agents increased by even more than that.²³⁶

The production changes and increases were supported – and in many cases brought about – by continued activity in the laboratories of the Rhine-based factories, though they became even more oriented to applications than they already had been by the late 1930s. The labs, like the Upper Rhine group itself, faced labor shortages. Where research establishments were concerned, however, this difficulty was exacerbated because many support staff were shifted from the labs into production.

During this early wartime period, the Main Laboratory at Ludwigshafen was firmly under the direction of another future member of the BASF managing board, Walter Reppe, and carried out a wide variety of research. But much of its most interesting work – at least in the view of Allied postwar investigators – involved the development of Reppe chemistry based on acetylene, which eventually would produce a wide variety of plastics and other important products. Although a number of important breakthroughs were made between 1939 and 1942, Reppe chemistry was still in its infancy even as late as 1943.²³⁷

In the other large laboratories of the Upper Rhine group (the Ammoniac Laboratory at Oppau and Pier's high-pressure pilot plant in Ludwigshafen), prewar work was pursued further, though it tended to be more oriented to applications. Especially important for the Pier laboratory was its continuing work on catalysts and other aspects of the hydrogenation process. The lab's endeavors also included major contributions to the development of a process for the dehydrogenation of fuels (DHD) to give them a higher aromatic content, which was a highly prized property for airplane spirit in particular. Work on the DHD process started in 1939, and by 1940 a semicommercial pilot plant was constructed. The Pöllitz facility, which began operating in January 1942, featured the first large-scale plant of this sort, though a smaller one had already been built in Ludwigshafen by November 1941. DHD plants

²³⁶ Sales figures from "Umsätze und Gewinne der BASF seit der Gründung 1865," BASF UA. Calculation of the percentages is based on them. Dr. Rötger, in "Bilanzziffern Ludwigshafen/Oppau im Rahmen der IG Farben/Ind. AG (1925–1945), Table IIb, n.d. [ca. 1966], BASF IG, T 01, Geschichte des Verkaufs, provides figures that are higher across the board but that work out to a somewhat more modest one-third growth in revenue for the group between 1939 and 1942. Other percentages are calculated on the basis of data from Dr. Rötger, "Chemikalien-Umsätze der IG und der BASF," Table 3b, September 23, 1969, BASF IG, T 01/1. Figures on Oppau's production from "Produktion Oppau 1937–1943," n.d., BASF UA, collection of material for history of firm, A 251.

²³⁷ BIOS, Subcommittee Surveys, Report number 30, "The Acetylene Industry and Acetylene Chemistry in Germany during the period 1939–1945," (London: H.M.S.O., 1951); Morris, "Ambros, Reppe," pp. 89–122, especially pp. 116–17.

were either in use or under construction at a number of the hydrogenation plants by the end of the war.²³⁸

Labor²³⁹

With the approach of war in summer 1939, the labor situation in Ludwigshafen and Oppau, which had been growing tight for about a year, became critical. Indeed, attempts to ensure an adequate labor supply bedeviled the group's management for the remainder of the war. The alarming decrease that the military draft and growing demands for armaments production caused in the group's workforce was offset in the short term by the arrival of around 4,000 German labor conscripts. But the demands of the war economy kept increasing during late 1939 and the first half of 1940. Together with the contraction caused by the departure of the *Rückwanderer* – the 1,500 Saarland inhabitants employed by Ludwigshafen and Oppau, who were due to return to their homes – this added strain led to the first significant deployment of foreign laborers: 500 Belgian POWs in the second half of June 1940. Within about six weeks, they were joined by a large contingent of Slovaks and Italians, in all well over 1,000 men.²⁴⁰ Work in mechanized and especially sensitive production operations was, of course, still carried out by highly qualified ethnic German workers, whereas the ever-increasing numbers of foreign workers were responsible for less sensitive and/or subsidiary and support operations.²⁴¹

The contingent of Belgian POWs was deployed at Ludwigshafen-Oppau on June 21, 1940. They constituted the first installment of a varied, enormous group of foreign workers, who eventually represented a significant part of the workforce at BASF's core plants. The group's leadership was acutely aware that partially "solving" the problem of short labor supply by this means entailed severe difficulties of its own. A major one was the accommodation, subsistence, and supervision of the foreign workers, not to mention the necessity of building extensive barracks, kitchens, and

²³⁸ BIOS, Final Report 373, "IG Farbenindustrie AG Ludwigshafen (Fuels and Lubricants)," (London: BIOS, n.d. [ca. late 1945]), pp. 139–40.

²³⁹ I am grateful to Eginhard Scharf for his helpful comments on this section.

²⁴⁰ United States Nuremberg War Crimes Trials: United States of America v. Carl Krauch et al. (Case VI), Transcript, vol. 114, testimony of Carl Wurster on April 9, 1948, pp. 10911, 109872–109874, IWM, London; Direktionssitzung in Ludwigshafen am Rhein am 28. Juni 1940, p. 2, BASF UA, C 13; poster dated June 17, 1940, BASF UA A 865/41; "Die Geschichte der Gemeinschaftsunterkünfte der IG Farbenindustrie Aktiengesellschaft Ludwigshafen/Rhein, 1. Teil vom Kriegsausbruch bis zum 23. September 1943," July 1, 1944, p. 2, BASF IG, A 865/41.

²⁴¹ Militärbefehlshaber in Frankreich, Verwaltungsstab, Wirtschaftsabteilung to Reich Economics Ministry (Mulert), "Betreff: Chemische Industrie Frankreichs," February 13, 1942, BAL, R7/2256.

sanitary facilities. Just as important, however, was the considerable social disruption that the influx of large groups of foreigners in Ludwigshafen and Oppau would cause. Shortly before the arrival of the first POWs in June 1940, that realization prompted the factory leadership to publicly air some of these fears, some of which were very thinly veiled. In a poster seemingly directed at the growing number of ethnic German women in the Upper Rhine group's workforce, group managers announced that, "according to Reich law, contact with the prisoners is permitted only in the framework of the employment relationship. Anything beyond that will be punished severely. To us, this regulation goes without saying, not least because our fathers, brothers, sons, and workmates are involved in heavy fighting at the front."²⁴²

Despite this concern, management applied to governmental labor offices for additional foreign labor even as the first Belgian POWs took up their work in Ludwigshafen-Oppau. In all, it was anticipated that 500 additional POWs would arrive later in the summer and that they would be joined by 500 Italians and 300 Slovaks. Arriving at the Upper Rhine group in late summer 1940, the Italians and Slovaks represented the first large-scale deployment of foreign civilian workers at the IG's core factories on the Rhine River.²⁴³

By late 1940, additional numbers of French, Dutch, Belgian, and Italian workers swelled the ranks of the foreign labor force in Ludwigshafen-Oppau. On June 1, 1941, less than a year after the deployment of the first Belgian POWs at the plants, there were more than 3,000 foreigners working there, including a large number of Polish POWs. The largest single group of civilian foreign workers was Slovaks, but they were followed closely by Italians. Other groups were much smaller and included French, Romanian, "Italians from Lorraine and France," and Dutch foreign workers. Two things are especially clear from an analysis of the composition of foreign labor used by the core Upper Rhine group factories through mid-1941. First, the presence of foreigners in the group's total waged workforce had, within a year, swelled from negligible numbers to 12.5 percent of the total. Second, most of the group's foreign workforce was western and southern European. Very few Poles were deployed among the civilian factory workers at this time, and those who were had come from France. The Slovaks, who represented a

²⁴² "Direktionssitzung in Ludwigshafen am Rhein am 28. Juni 1940," p. 2, BASF UA, C 13; quotation from poster dated June 17, 1940, BASF UA A 865/41; "Die Geschichte der Gemeinschaftsunterkünfte der IG Farbenindustrie Aktiengesellschaft Ludwigshafen/Rhein, 1. Teil vom Kriegsausbruch bis zum 23. September 1943," July 1, 1944, BASF IG, A 865/41.

²⁴³ United States Nuremberg War Crimes Trials: United States of America v. Carl Krauch et al. (Case VI), vol. 114, testimony of Carl Wurster on April 9, 1948, pp. 109872-109874, IWM, London; Direktionssitzung in Ludwigshafen am Rhein am 28. Juni 1940, p. 2, BASF UA, C 13.

significant proportion of the foreign workforce, were often in fact ethnic Germans.²⁴⁴

The renewed vigor of military operations after the German attack on the Soviet Union (Operation Barbarossa) in June 1941 diverted more and more workers of German nationality to the front, a loss partially offset by the growing numbers of foreign workers. By November 1941, the total foreign workforce had grown to 6,251, or about one-quarter of all waged workers employed at the plants. Still, there were few “eastern” laborers (except the Polish POWs) engaged at the core plants until autumn 1942.²⁴⁵ They were the “*Ostarbeiter*,” and, along with Poles, they were treated far differently from the rest of the foreign workforce at Ludwigshafen-Oppau.²⁴⁶ Their deployment is examined in the next section.

The initial years of World War II represented a period of extensive change for the Upper Rhine group despite relative constancy in its top-level personnel and in the organization of its parent firm, IG Farben. The death of Carl Bosch symbolized the end of an era; the ascendance of people such as Otto Ambros, the beginning of another. The stresses and strains of war had only mild effects through much of 1941, mainly because Germany seemed destined to coast to an easy victory. But even in the years from 1939 to 1941, the pressure of the fighting had a major impact on the product mix and labor supply of the firm. In addition, the demands associated with designing and building new plants to support the war effort strained its technical capacity. Intensification of the war in late 1940 and during 1941 also seemed, however, to offer a rare opportunity to the technical staff of the group, one that Otto Ambros wished to exploit in order to reunite and reintegrate the group in a new project to be pursued jointly by Ludwigshafen and Leuna. Auschwitz was the result, and Ludwigshafen played a crucial role in its conception and realization. At the core group factories, too, the war and National Socialist racial policies were beginning to have their consequences with the

²⁴⁴ Table by BASF Personalabteilung from VT, “Der Mensch in BASF,” C 621/2; and from contemporary tables, especially “Ausländer,” June 1, 1941, in C62205: Sozial Entwicklung. Arbeiterstand 1897–1946, BASF UA. The proportion of foreign laborers to the total workforce is calculated from figures given in these sources, although the foreign workforce from June 1941 is divided into the total number of workers at Ludwigshafen and Oppau as of January 1 of that year.

²⁴⁵ Contemporary tables, especially “Ausländer,” November 30, 1941, in C62205: Sozial Entwicklung. Arbeiterstand 1897–1946, BASF UA. The proportion of foreign laborers to the total workforce is calculated from figures given in these sources, although the foreign workforce from November 1941 is divided into the total number of workers at Ludwigshafen and Oppau as of January 1, 1942.

²⁴⁶ Eginhard Scharf makes this point convincingly in “Disziplinierung, Unterdrückung und Verfolgung,” a draft chapter in his forthcoming history of foreign labor in Ludwigshafen during the National Socialist period. I am grateful to Dr. Scharf for allowing me to see an early version of this chapter.

first deployment of foreign labor. Unbeknownst to most Upper Rhine group managers in mid-1941, however, the war was taking a turn for the worse.

7. THE BASF GROUP IN TOTAL WAR, 1942–1945

The German declaration of war against the United States on December 11, 1941 came only shortly after the German offensive against the Soviet Union stalled just outside the Moscow city limits and just after the first large-scale gassing of Jewish inmates started at the death camp in Chelmno. Economically and politically, it became necessary for Germany to intensify its war effort, and the first weeks of the new year thus precipitated a flurry of activity. In January, officials from a variety of governmental agencies gathered at a villa in Wannsee, a southwest suburb of Berlin, where they discussed details of the “final solution to the Jewish question” (the Wannsee Conference). By February, the newly formed Ministry of Armaments and Munitions had come under the control of Albert Speer and began to undertake substantial economic reforms. The fall of Stalingrad in January 1943 marked a further stage in the changing character of the war. The last scruples disappeared when, in the aftermath of the defeat, Josef Goebbels announced in the Sportpalast in February 1943 that Germany was now involved in a “total war.”²⁴⁷

For the Upper Rhine group, the changes in both style and substance in the German conduct of the war entailed enormous and fateful steps. Plants and equipment were operated around the clock, with little regard for, or possibility of, adequate maintenance let alone replacement. R&D efforts, already far different from what they had been in the late 1920s, were scaled down still further and now more focused than ever on immediate applications to further war production. Yet at the same time the group and its management engaged in a furious burst of new construction, especially for autarky-related projects in synthetic fuels and rubber.

The latter involved the group intimately in the most disastrous and shameful projects it had ever engaged in, and one of the most notorious in modern industrial history: designing and building an IG Farben plant at Monowitz, near the infamous Auschwitz death camp. The role of the group in the construction and partial operation of this facility bears close scrutiny in this section, continuing the story started in the last one. Still, the involvement of the Upper Rhine group in IG Auschwitz was only the most prominent instance of complicity in the ignominious practices of a criminal regime. The use of forced labor – not just at Auschwitz but also at the group’s main plants, especially in Ludwigshafen and Oppau – is also considered in further detail in this section.

²⁴⁷ Abelshauser, *Germany*, pp. 151–7.

As the war dragged on, the moral erosion of many Germans, including those in industry, was accompanied increasingly by death and physical destruction on a scale never before visited upon an industrialized country. Allied air attacks put the group's core factories in Ludwigshafen and Oppau virtually out of commission even before the end of 1944.

Total War and the Upper Rhine Group Factories

From 1939 through 1941, the German economy had been organized to plan and deliver needed war supplies in a variety of ways, with a number of organizations at the top responsible for overlapping jurisdictions. Still, the main organizing principle was for government and the military to enlist the private sector to assume many of these functions through governmentally sponsored "economic groups," such as the one for chemicals and the one for oil. IG Farben personnel held the chairmanships of both these economic groups, and their positions were strengthened through close ties with the plenipotentiary-general for the chemical industry, Carl Krauch. One other source of power – or at least one way in which the industrialists held on to a remnant of freedom of maneuver – was the exploitation of the overlapping jurisdictions of governmental and party authorities.

The move to a total war footing changed this arrangement somewhat. When Albert Speer became Minister of Armaments and Munitions in February 1942, he managed to gain more and more control over the war economy from other competing organizations in the governmental and party hierarchy. The role of the economic groups, which were controlled by Speer, continued to be very important. But Krauch tended to lose power over time through challenges to his authority not just from Speer but also from Heinrich Himmler of the SS. What is more, the power and authority of Krauch's main patron, Hermann Göring, were also waning, so by 1944 Krauch was a beleaguered man.²⁴⁸

If Krauch's star was dimming, the same was true to a lesser degree for the Upper Rhine group's Otto Ambros. Synthetic rubber remained a high-prestige item in the latter years of the Third Reich, but because most of the economy's needs were covered by existing plants, its priority in the allocation of materials and labor was lowered. From January 1942 on, oil works – synthetic and otherwise – had the highest priority for the allocation of resources of all sorts.²⁴⁹

This reshuffling of the pecking order ensured that Ludwigshafen, Oppau, and especially Leuna remained highly favored recipients of resources during the final years of the war. The problem for Germany was, of course, that there

²⁴⁸ Hayes, *Industry and Ideology*, pp. 370–4. ²⁴⁹ Wagner, "IG Auschwitz," p. 100.

was never enough to provide for all of the projects that had been started and that even that material diminished rapidly both relatively and absolutely beginning in 1942–3. The relative decline occurred because the United States entered the war in earnest, bringing with it virtually inexhaustible productive capacity and large numbers of well-fed and capable people to put the country's output to use. The absolute decline resulted from massive loss of life, especially on the eastern front. It also stemmed from the destruction of physical facilities through Allied bombing, which became a growing everyday occurrence in the latter part of the war.

In the face of repeated and ever more devastating Allied pummeling, extensive plans were made – and some even carried out – for relocating production facilities, especially underground. Few were implemented for the factories of the Upper Rhine group, however. Instead, the factories' leadership simply tried to continue production in the face of bombing, with less and less success.

Production Trends

Levels of investment in the Upper Rhine group plants during the latter years of the war remained very high, at least through 1944, corresponding to their importance to the National Socialist war effort. Virtually all of the IG's largest investments between 1941 and 1944 were made in factories associated with the former BASF. The largest outlays were for new plants linked to, but not directly controlled by, the Upper Rhine Group's core factories. For instance, RM 343 million was directed to the Heydebreck synthetic fuels, methanol, and ammonia facility. Heydebreck was, to be sure, not placed administratively in *Sparte I*, nor did it become part of the Upper Rhine group. But it stood under the overall directorship of Oppau's plant manager, Martin Müller-Cunradi, who appointed the heads of each of the new plant's main components from his Oppau staff.²⁵⁰ Meanwhile, an additional RM 322 million was invested from 1941 through 1944 in the IG Auschwitz plant, about 50 miles east-southeast of Heydebreck, which was under the formal control of Ludwigshafen's Otto Ambros and Leuna's Heinrich Bütefisch. The size of the investment in these two new plants indicates the extent to which Upper Silesia had been identified as a location for vast expansion of production. The figures also suggest that the opportunity to demonstrate the full technological capabilities of the Upper Rhine group on a grand scale was not restricted to the Auschwitz-Monowitz plant. In fact, investment in Heydebreck slightly exceeded that in the more infamous Monowitz facility. Significantly, too, neither of these large plants had been completed by the

²⁵⁰ Ernst Struss, Affidavit, "Die Betriebsgemeinschaften und die Entwicklung der IG," August 30, 1947, p. 31, NI-9487, BASF UA.

time the war ended, and their output, which was restricted to a few relatively small internal production facilities that actually were completed, contributed very little to the war effort.²⁵¹

Other core and associated factories of the Upper Rhine group were also targeted for large-scale infusion of funds in the final years of the Third Reich. Between 1941 and 1944, the third-ranked factory in terms of investment within the IG was Ludwigshafen itself, which received a total of RM 215 million, including RM 91 million for the Buna III facility. These sums, combined with the investment in Oppau, brought total funding to the core factories on the Rhine to RM 306 million between 1941 and 1944. The Leuna works received RM 229 million of investment during this period; the buna facilities at Schkopau and Hüls, RM 179 million and RM 133 million, respectively. Except for Bitterfeld, Moosierbaum (which, like Monowitz, lay outside Germany's 1937 borders), and the IG coal mines, all of which received between RM 102 and RM 107 million in investment between 1941 and 1944, no other IG factory managed to obtain more than the RM 60 million in funding during the period. The Hoechst and Leverkusen main works obtained just RM 53 million and RM 45 million, respectively.²⁵²

As the examples of Heydebreck and Auschwitz indicate, however, large-scale investment did not necessarily translate into increased industrial output in the last years of the Third Reich. After all, neither of them delivered anything near their planned output. Instead, three other things determined the level of production of various products at Ludwigshafen and Oppau between 1942 and 1945: the quantity and quality of the labor available, the priority level and availability of raw materials, and Allied bombing raids. Labor is considered in detail in the following section. The interaction of the last two factors are the main subject here.

All other things being equal, one would expect that Oppau, with its range of vital synthetic and heavy chemical products, would maintain or improve its output of goods during the years of total war. Enjoying high priority in the supply of raw materials and a relatively modern plant, Oppau would be hindered only by the correspondingly high priority that Allied bombing experts would place on the factory's destruction. The facility did indeed maintain, and in some cases even dramatically increase, production of key products through 1943. This performance is no doubt attributable primarily to the fact that Allied targeting staff did not begin the strategic bombing of the

²⁵¹ "Investments for large plants of the IG," August 18, 1945, Public Record Office, Kew, FO 1031/233; Affidavit Ernst Struss, "Auschwitz," June 9, 1947, NI-7241, IWM, London; Combined Intelligence Objectives Subcommittee, CIOS Item No. 30, File XXX-103, "Report on Investigations by Fuels and Lubricants Teams at the IG Farbenindustrie AG Works at Ludwigshafen and Oppau" (London: HMSO, August 16, 1945), pp. 44–8.

²⁵² "Investments for large plant of the IG," August 18, 1945, Public Record Office, Kew, FO 1031/233.

facility until the end of July 1944. Damage to the factories before that time was mainly a by-product of attacks on Mannheim and Ludwigshafen.²⁵³

Oppau produced about one-third of Germany's synthetically manufactured nitrogen, which was used to make fertilizers, explosives, and other key goods. During 1942, output of nitrogen at the plant amounted to 255,000 metric tons, down very slightly from 1941. It went down by about 10 percent from 1942 to 1943, to 225,000 metric tons. This slide was due most importantly to the disruption that three bombing raids (late September, mid-November, and late December) caused to water and/or power supplies to the plant. Once those supplies were restored, however, the plant again moved quickly to full production. But the bombing also affected other lines, such as urea-formaldehyde products. The same was true for the synthetic lubricant Oppanol, production of which also receded by about 10 percent over the same period.²⁵⁴

Despite these raids, levels of output for other key lines were either maintained or increased during the first two years of total war. And most of these products were essential to the war effort. Isobutyl oil production, for instance, remained steady at 163,000 metric tons per year during 1942 and 1943, a quarter more than the output in 1941. These levels were especially important because some of the alcohols created as a by-product were hydrogenated for fuels. Detergent raw materials also remained steady from 1942 to 1943, but production in both years was more than three times the level of 1941. The most spectacular gains, however, were seen in production of aviation gasoline, which increased more than sixfold from 1941 to 1942 and by an additional two-thirds from 1942 to 1943.

For Oppau, the massive scale and strength of production equipment and the fact that its buildings were generally constructed with steel frames, reinforced concrete, or both improved the factory's ability to withstand bombing than its sister factory in Ludwigshafen. For the most part, however, this advantage was eventually offset by three factors. First, Allied bombers eventually targeted the plant intensively. Second, Oppau's production plants were often highly dependent upon one another. Third, all of these production plants depended heavily on fragile systems of power and water supply. In the months that followed the start of strategic bombing of the facility on July 31, 1944, production levels tailed off noticeably. Heavy attacks began in mid-August, and though the plants' massive construction often made it possible to resume production fairly quickly, the repeated battering gradually took its toll. In August 1944 the damage from Allied air raids was also compounded

²⁵³ USSBS Oil Division, *Ludwigshafen-Oppau Works of IG Farbenindustrie AG, Ludwigshafen, Germany*, 2nd ed. (January 1947), pp. 5–7.

²⁵⁴ Material for this paragraph and the following ones comes primarily from USSBS Oil Division, *Ludwigshafen-Oppau Works*, pp. 28–33, with statistics derived from calculations based on the table on p. 33.

by an unrelated explosion in the butyl and methanol plants. As a result, ammonia production at Oppau plummeted that year to just 138,000 tons, less than 66 percent of its 1943 rate, and output of DHD and aviation gasoline, absolutely critical to the German war effort, fell to just 58 percent of its 1943 level. Isobutyl oil manufacture diminished even further, amounting to just 23 percent of the 1943 production rate. Urea-formaldehyde production, too, nose-dived in 1944 to a quarter of the previous year's production rates, and the manufacture of detergent raw materials and Oppanol lubricants was halved.

More Allied raids in late 1944 and in the early days of the new year ensured that there was virtually no production at the plant during 1945. Again, though, the crippling of the factory had less to do with damage to the production plant itself than with the plant's fragile infrastructure, which connected and serviced a wide variety of operations. As plant manager Martin Müller-Cunradi indicated on January 3, 1945, a heavy air attack of the previous evening meant that bombing damage was "distributed over the entire plant and this time some of our most important basic operations have unfortunately been hit, including the gas-manufacture, hydrogen-conversion, hydrogen-purification, and Linde plants. Many lines, tracks, and buildings were destroyed. Several of our large gas storage units were hit." The water works had also been damaged severely in this attack and earlier ones.²⁵⁵

Unlike Oppau, Ludwigshafen featured a number of lines with relatively low priorities owing to their less direct irrelevance to the war effort (though many others were important to the fighting and thus clearly favored in Nazi raw materials allocation policies). But their immediate proximity to each other – in fact the two plants had largely grown together by wartime – meant that the facilities in Ludwigshafen suffered most of the same Allied bombing raids and sustained similar levels of damage as those in Oppau. This fate was due in no small part to the fact that the raids were notoriously inaccurate, even in the late stages of the war, when the Allies had clear air superiority. The targets in Oppau, the city of Ludwigshafen, and even Mannheim often led to stray bombs striking the Ludwigshafen plant.²⁵⁶ In addition to bombing damage, Ludwigshafen suffered a catastrophic explosion within its factory gates on July 29, 1943. It killed 50 people, severely injured 80, and left another 600 with lesser injuries. The dead included several high-level plant managers, and Dr. Matthias Pier of the high-pressure laboratory sustained severe head injuries. A number of production lines were damaged, as was the experimental apparatus for Oppanol synthetic lubricating oil.²⁵⁷

²⁵⁵ USSBS Oil Division, *Ludwigshafen-Oppau Works*, pp. 31–3, quotation p. 32.

²⁵⁶ USSBS, *Overall Report (European War)* (September 30, 1945), pp. 4–5.

²⁵⁷ "Direktionspostsitzung am 30. Juli 1943 in Ludwigshafen," BASF UA, C 13, Direktionssitzungen 1940–1945.

Dyestuffs had been an area of strength in Ludwigshafen's production throughout its history. The fact that dyes were generally produced using batch processes in relatively small units usually entirely independent of each other meant that they were better able than more highly integrated processes to avoid catastrophic declines in production when bombing began in earnest in 1943 and 1944. Nevertheless, damage to utilities and shortages of raw materials (in general, the latter was only indirectly related to bombing until very late in the war) severely scaled back manufacturing. After the attack of August 14, 1944, production of dyes and dyestuffs intermediates limped along at just 10 percent of its previous rate until it ceased entirely in February 1945.²⁵⁸

By contrast, much of the output of the Ludwigshafen chemical intermediates department was more central to the war effort, and many of the lines were therefore accorded high priority within the war economy. Still, the mutual interdependence of production processes in the unit made them especially susceptible to bombing damage. Thus, with some important exceptions such as formaldehyde and textile-related products, manufacture was severely curtailed by the raids of August 1944 and virtually ended by those in September. Raids at the end of December 1944 and the beginning of January 1945 brought all production to a halt, with the exception of a small quantity of textile-related products, which were manufactured as late as February 1945.

The solvents and plastics department at Ludwigshafen produced goods in fairly small quantities, especially compared to production levels reached after the war. Nonetheless, some of these materials were essential to the war effort, especially in specialist applications in the electrical industry. Again, though, there was a high level of interdependence among the production processes, and shortages of raw materials, combined with utilities failures stemming from collateral bombing damage, brought output to new lows by autumn 1944. For the first seven months of 1944, the department was able to produce at about 80 percent of capacity. But bombing raids in mid-August reduced production to just under 30 percent of rated capacity, and the additional raids later that month and in September cut manufacture to about 5 percent. It was possible to resume production in some lines during the following months, but it was virtually halted in late December. Production ceased entirely in February 1945.

The inorganic chemicals department at Ludwigshafen produced a number of key materials used in other processes, in particular sulfuric acid and chlorine. The department was therefore among the high-priority areas. Between January and July 1944, the department operated at almost full capacity. Again, though, damage to utilities and the rail service for the department,

²⁵⁸ Material for this paragraph and the following ones comes primarily from USSBS Oil Division, *Ludwigshafen-Oppau Works*, pp. 34–44.

along with shortages of raw materials, rapidly cut production rates to 36 percent of capacity in August 1944 and to 3 percent in September. Although it proved possible to manufacture some sulfuric acid in the months that followed, all other lines were brought to a virtual standstill, and there was no production at all during January 1945.

Ludwigshafen's fifth and final department was that for buna production. Established in the early 1940s and brought into limited operation in 1943, the department had clear relevance to the war effort. It was, furthermore, a plant that had high technological value. Unlike the other synthetic rubber plants, they used the three-stage Reppe process for producing the vital buna component butadiene. Full-scale production did not begin until January 1944, and buna output averaged about 64 percent of rated capacity. The bombing raids of August 1944 curtailed output for that month compared to July, though it still exceeded the average monthly rate for the first seven months of the year. The attacks of September, however, all but stopped production, and there was no manufacture of buna at Ludwigshafen after October.

In examining the impact of bombing on production at BASF's Rhine-based factories, one must keep in mind that the Ludwigshafen and Oppau plants were *not* targeted by the Allies because of their contributions to the war effort through their general chemical production. Nor did the Allies strike the plants because of their capacity for producing nitrogen (for explosives and for some rocket fuels), methanol (for other military explosives), or buna rubber. Instead, the facilities figured high on Allied bombing lists solely because of their capacity to produce synthetic fuel and lubricants and/or to refine petroleum. Other plants at the factories were knocked out as a by-product of their physical proximity to, and technological interconnections with, these processes. In the case of Ludwigshafen and Oppau, the "dividend" to Allied bombing missions was substantial indeed because the two together produced more than 2,000 separate products.²⁵⁹

The targeting of synthetic fuel was part of a broad-based strategic identification of the German oil industry as of mid-1944. The first of the heavy air raids took place on May 12, but it was June 8 before General Carl A. Spaatz stated clearly in a dispatch to the U.S. air forces that the "primary aim . . . is now to deny oil to enemy air forces." As a result of this new directive, Leuna, even more than the Upper Rhine group's parent plants on the Rhine, moved very high on Allied target lists. Again, the punishment the facility took led to unexpected dividends for the Allies, for it affected not only the production of oil but also the manufacture of nitrogen and methanol. In contrast, the Schkopau synthetic rubber plant, which lay a short distance

²⁵⁹ USSBS Oil Division. *Ludwigshafen-Oppau Works*, p. 4.

away from Leuna, was relatively unaffected by bombing. The net result of these raids in Germany was a precipitate drop in the production of synthetic fuel and other key chemicals, a change that had particular effects on airplane spirit supplies. By late summer and early autumn of 1944, the industry had collapsed for all practical purposes, and the Reich was faced with ever more serious fuel shortages for the remaining months of the war.²⁶⁰

In the face of such air attacks in the waning months of the Third Reich, many factories relocated underground as managers tried to maintain war production. Although Ludwigshafen and Oppau relocated some of their finishing and packaging plants, however, they were not involved in massive reorientation of production facilities. Instead, most capacity that had not been destroyed by the bombing or in the explosion of July 1943 remained in place at the core plants on the Rhine or in associated facilities such as Leuna.²⁶¹

Because of the worsening disruption to production at the Upper Rhine group factories and the ever-higher priority accorded to staving off defeat no matter how, R&D work suffered. The Ammonia Laboratory, for instance, saw the number of academics working there dwindle markedly. Some of them were called up to service at the front, where some died, but most were seconded to other facilities. During 1942, for instance, a group led by Dr. Sachsse was redeployed to a synthesis gas facility, and a number of other laboratory personnel were transferred to the large new plant at Heydebreck. The technological capabilities of the core group factories on the Rhine were stretched to their very limits and beyond through autarky and the war effort, as clearly illustrated by such developments. But things worsened as the war continued. By January 1945, only a few top personnel and some older workers remained at work in the lab, and little work was done until after the arrival of the U.S. military in March 1945. All in all, about 50 percent of the Ammonia Laboratory's physical facilities were destroyed during the war, along with about 25 percent of its technical equipment.²⁶² Total staff at the Ludwigshafen-based Main Laboratory, run by Walter Reppe, shrank dramatically between the beginning of 1942 and the start of 1945. Again, academics often were transferred to other locations, indicating once again that the Upper Rhine group's technological capabilities had been pushed beyond the breaking point.²⁶³

²⁶⁰ USSBS Oil Division, "Final Report: German Oil, Chemical, Rubber, Explosives, and Propellants Industries," August 25, 1945, especially pp. 1–3, Figures 2–3.

²⁶¹ "Direktionsbesprechung am 2.2.1944 in Ludwigshafen am Rhein," BASF UA, C 13, Direktionssitzungen 1940–1945.

²⁶² E. Wolffhaardt, "Geschichte des Ammoniaklaboratoriums während des II. Weltkriegs 1939 bis 1945," n.d., pp. 129, 131–4, BASF UA D 201/3.

²⁶³ Curt Schuster, "Die Geschichte des Hauptlaboratoriums 1938–1957," n.d., p. 230, BASF UA.

Labor

The total waged workforce of the core Upper Rhine group factories at Ludwigshafen and Oppau (on average the total workforce, including white-collar workers and technical and management personnel was 20 to 25 percent higher) continued to expand from early 1942 (27,497 active workers) to early 1944 (34,403). This increase of about one-quarter²⁶⁴ – despite the tightness of the labor market – reflected the plants' high level of importance for the war effort. It was accounted for by and large by the increasing numbers of foreigners engaged at the plants, many of them forced laborers. Ever more of them came from the conquered east, though western European, especially French and Italian, labor continued to be very important. A growing number of women, too, came to work in the core Upper Rhine group factories, though these people came almost entirely from the conquered east. In other words, the numbers and composition of the foreign workforce at the Upper Rhine group between 1942 and 1945 changed in tandem with the vagaries of the war and the radical implementation of National Socialist racial ideology in the east.

In late 1941, about one-quarter of all waged workers employed at the Ludwigshafen and Oppau plants were foreigners, and this proportion remained roughly the same through most of 1942. However, at the end of that year and the beginning of 1943, the number of foreigners soared. In late January 1943, over 12,000 foreign workers toiled at the core factories of the Upper Rhine group, more than double the 5,901 at work there on October 1, 1942. Foreigners now accounted for a third rather than a quarter of the total workforce at the plants, a change that corresponded to the greater intensity of the fighting in the east in particular, which required both greater production and larger numbers of German nationals as soldiers. By January 1944, there were 11,781 foreign workers at the Rhine-based plants, again just over a third of the workforce. The number of foreigners active in Ludwigshafen and Oppau fell to 7,910 by January 1945, but smaller numbers of workers across the board meant that they still made up one-third of the total waged workforce.²⁶⁵

The establishment of the eastern front also had an effect on the composition of the foreign workforce, though this impact was delayed. The first “eastern Russians” (*Ostrussen*, as they were labeled in contemporary documents)

²⁶⁴ Table by BASF Personalabteilung, from VT, *Der Mensch in BASF*, C 621/2; and from detailed contemporary tables in C62205: *Soziale Entwicklung. Arbeiterstand 1897–1946*, both in BASF UA.

²⁶⁵ Percentages calculated on the basis of figures in table by BASF Personnel Department, from VT, *Der Mensch in BASF*, C 621/2; and from detailed contemporary tables in C62205: *Soziale Entwicklung. Arbeiterstand 1897–1946*, both in BASF UA, especially “Ausländer,” October 1, 1942; “Ausländer,” January 31, 1943; “Ausländer,” January 31, 1944; and “Ausländer,” January 31, 1945.

arrived at the plant in April 1942, though at that point only 110 eastern Russian men worked at the plants, amounting to just a small percentage of the total labor supply. By June, however, the number of eastern Russians at the core Rhine-based factories had increased to 410. This total rose during July 1942 to 1,173 and during August to more than 1,400. At practically the same time, a large group of White Russians arrived at the plants from France, including 450 in June 1942, though this number dropped to 430 by November. The first “Galicians” (from the north slope of the Carpathian mountains, an area including modern-day southeastern Poland and western Ukraine) arrived at the factories in November. Although there were just 38 of them at first, this figure rose in the following month to more than 500.²⁶⁶

The gender composition of these groups of eastern European workers was even more remarkable than their rapid increase in numbers, and the willingness of National Socialist labor authorities – and the Upper Rhine group management – to use women in the factories stood in marked contrast to their views regarding German and western European women. Well over half of the 410 eastern Russians working in the plants in June 1942 were women, along with nearly a quarter of the 450 Russians who had come via France. Together, the two groups represented over 70 percent of the total foreign female workforce employed at Ludwigshafen and Oppau. By the end of the year, women from these groups made up more than three-quarters of all female foreign workers in action at the Upper Rhine group core plants.²⁶⁷

As the war took a turn for the worse in the east, especially after the battle of Stalingrad in late 1942 and early 1943, the number of eastern European workers at the plants stabilized, though there was a substantial increase in the number of French workers. Early in 1943, the largest contingent of foreign workers consisted of eastern Russians (2,511), but they were followed closely by French workers (2,272). Italians (1,137) represented the third largest group of workers. Again, though, a key difference between the groups of workers from eastern Europe and those from the west lay in their gender composition. The French and Italian contingents were overwhelmingly male, whereas those from eastern Europe were in general mostly female. By March 1943, however, the French workforce at the Ludwigshafen and Oppau factories exceeded all others by far, especially when one takes into consideration not just French civilian employees of the factories but also employees of foreign contractors (all of whom were French) and POWs (of whom about half were French).²⁶⁸

²⁶⁶ “Ausländer,” April 30, June 30, August 1, September 1, November 30, December 31, 1942, BASF UA C 62205: Soziale Entwicklung, Arbeiterstand 1897–1946.

²⁶⁷ “Ausländer,” June 30, December 31, 1942, BASF UA C 62205: Soziale Entwicklung, Arbeiterstand 1897–1946.

²⁶⁸ “Ausländer,” February 28, March 31, 1943, BASF UA C 62205: Soziale Entwicklung, Arbeiterstand 1897–1946.

Deployment of foreign labor at Ludwigshafen and Oppau reached its peak in April 1943, after which point the numbers declined slightly each month through most of 1944. Combined with additional call ups to the armed forces within the German national workforce, the result of this relative stability was a growing severity of labor shortages. One of the main problems stemmed from workers on leave under a so-called *Bürgenurlaub* holiday system. A study in February 1944, for instance, indicated that about half of the 845 French and 163 Belgians who went on vacation under this scheme never returned to work. The same applied to about a third of the 109 Dutch and virtually all of the 15 Galicians who participated.²⁶⁹

Eastern Russian and French workers continued to constitute the largest single contingents, with the latter dominating numerically, especially if contract laborers and POWs are added to the civilian worker total. The national groups already at the plants were joined by yet another in May 1944, when 119 male and 262 female western Ukrainians arrived. Again, the willingness to use female workers from the east in particular is worthy of note. The other major shift came in the form of Italian POWs, whose numbers reached 2,161 in November 1944. By the beginning of 1945, however, the ranks of foreign workers thinned markedly across the board as the plants' production limped along after increasingly severe Allied bombing raids. By the end of January, there were at most 7,910 foreign workers employed at the factories. Eastern Russians constituted the largest single group, though French workers (including contract laborers and POWs) continued to occupy a prominent position in the plants' labor supply.²⁷⁰

The various groups also worked under very different conditions, with western Europeans having the most freedom, and *Ostarbeiter* the least. By and large, the foreign labor force worked conscientiously, as a study done for the directors of the Ludwigshafen and Oppau factories showed in January 1943. Of total working time theoretically available to approximately 7,600 foreign workers in December 1942, about 90 percent of it was actually worked. And the directors were assured that this track record was quite good "when one takes into account the special circumstances under which the foreigners came to us and have been deployed by us." Analyzing the 10 percent of potential work time that was not actually worked, the study found that about 40 percent of that block was accounted for by illness, with the remaining 60 percent divided approximately equally between excused absences and unexcused absences. There was clearly room for improvement in this latter category "through suitable education measures." The study demonstrated further that virtually all of the national groups clustered around the

²⁶⁹ "Direktionsbesprechung am 2.2.1944 in Ludwigshafen am Rhein," BASF UA, C 13, Direktionssitzungen 1940–1945.

²⁷⁰ "Ausländer," April 30, 1943; May 31, November 30, 1944; January 31, 1945, BASF UA C 62205: Soziale Entwicklung, Arbeiterstand 1897–1946.

90 percent mark in terms of available time actually worked, though the western Europeans generally were slightly under that mark. The one exception was Spanish workers, who showed up for work only about two-thirds of time, whereas more than a quarter of their available working time consisted of unexcused absences. Ominously, the report noted that “the conspicuously poor work ethic of the Spanish in December has forced the factory leadership, together with the DAF and the Gestapo, to take special measures, which have brought about an improvement.”²⁷¹ As it turns out, the factories were fighting a losing battle on this issue, and the Spanish workers were eventually sent home in autumn 1943.²⁷²

In contrast to the western European workforce and the Spanish in particular, the study reported that Poles (3.1 percent of the total foreign workforce) and *Ostarbeiter* (24.1 percent) worked 94.2 and 95.6 percent of the working time available to them, respectively. Moreover, unexcused absence accounted for just 1.8 percent of total available working time among Poles and a minuscule 0.7 percent among eastern workers. As the report noted, this pattern had to do with the level of security and restrictions on movement surrounding them: “The very favorable statistical results shown by the Poles and the *Ostarbeiter* are surely based on the fact that these nationalities have certain restrictions on their personal freedom and, for instance, are not involved in family visits. Moreover, unexcused absences from the labor camp can be better supervised.”²⁷³

It is worth underscoring the language of the time, which, though guarded and indirect, was nonetheless also menacing. One spoke of “suitable education measures” and “special measures,” for instance. It is telling as well that the national groups were so rigidly separated in the careful records kept about them. There were also racially motivated governmental directives discriminating between the various nationalities in terms of pay, working conditions, and food rations, and Upper Rhine group managers seem to have applied these governmental guidelines especially zealously at times, as we shall see shortly. Before we investigate such practices, however, it will be useful to examine the housing of foreign workers at the Upper Rhine core plants, where again differences existed by nationality.

The massive presence of foreigners in the works and in the city itself posed challenges in a number of areas, not least in terms of accommodation. The initial groups of German workers brought in from the Saarland and from southern Germany were housed in dormitories (*Kameradschaftsheime*) and in guesthouses in Mannheim. However, the massive influx of foreign workers

²⁷¹ IG Ludwigshafen, Personalabteilung, “Betr.: Arbeitseinsatz ausländischer Zivilarbeiter,” January 5, 1943 and attachment, BASF UA, C 13, Direktionssitzungen 1940–1945.

²⁷² Eginhard Scharf, “Disziplinierung, Unterdrückung und Verfolgung,” pp. 24–5.

²⁷³ IG Ludwigshafen, Personalabteilung, “Betr.: Arbeitseinsatz ausländischer Zivilarbeiter,” January 5, 1943 and attachment, BASF UA, C 13, Direktionssitzungen 1940–1945.

(from nearly zero to over 1,000 between June and August 1940, to nearly 6,000 by October 1942, and to over 12,000 by January 1943) created a pressing need for additional housing, washing facilities, kitchens, hospitals, and other things. An in-house history written at the core Upper Rhine group factories during the war indicated the existence of seven camps by the middle of 1944, with beds available for around 14,000 imported laborers. Each camp was built to accommodate a few specific different national groups. The first, constructed in 1940 and expanded thereafter, housed Slovaks, Italians, Belgians, and POWs with their guards. The second, built in 1941, included western Europeans (Germans from other parts of the country, French, and Dutch). Camp III housed Germans who had come to the Ludwigshafen-Oppau factories from other parts of the country, White Russians, Croats, Poles, Spaniards, and Bulgarians. Camps IV and IVa, erected beginning in May 1942, housed Poles, western Ukrainians, and *Ostarbeiter*, many of whom, unlike the others, were married couples or single women. Building work for Camp V began in March 1943 to accommodate the previously noted additional French contract workers. The final camp, VI, began operations in early 1944, catering to work commandos from the army, domestic air-raid battalions, French, and “assorted foreigners.”²⁷⁴

The camps were located for the most part on factory-owned land and constructed by the Upper Rhine group’s own construction battalions. Buildings on the sites were generally of wood and used prefabricated sections. They were furnished with rudimentary beds and storage. Each camp had its own washing and kitchen facilities, as well as medical, cleaning, and other support staff. In keeping with the language and attitudes of the times, the aforementioned official wartime history made reference to the allegedly inferior hygiene habits and backwardness of foreigners: “A large washing facility [for camp I], with 109 taps, 40 showers, two bathtubs in their own enclosures and including facilities for washing clothes extended an invitation to vigorous use, though obviously this invitation was not taken up all the time. Some of those who arrived showed a similar deficit in understanding about the flushing mechanisms with which the toilets were fitted.”²⁷⁵ Such prejudices ring harsh in contemporary ears. But the available evidence does not indicate that the housing and other accommodation were anything but adequate, though conditions were certainly not good during the construction phase or after infrastructure was destroyed by heavy air raids. Like many other things in the war, the structures were thrown up very rapidly,

²⁷⁴ “Die Geschichte der Gemeinschaftsunterkuenfte der IG Farbenindustrie Aktiengesellschaft Ludwigshafen/Rhein, 1. Teil vom Kriegsausbruch bis zum 23. September 1943,” July 1, 1944, BASF UA A 865/41.

²⁷⁵ “Die Geschichte der Gemeinschaftsunterkuenfte der IG Farbenindustrie Aktiengesellschaft Ludwigshafen/Rhein,” 1. Teil vom Kriegsausbruch bis zum 23. September 1943, July 1, 1944, p. 3, BASF UA A 865/41.

and they were undoubtedly quite primitive. But it clearly lay in the interest of management to have a healthy workforce, regardless of where particular workers hailed from, and the accommodation was designed to preserve that possibility.

Still, the camps, their infrastructure, and the policy applied in them also helped reinforce National Socialist racial aims. The groundwork was laid in 1938, when a reorganization of the Ludwigshafen-Oppau works security service gave it new powers, in effect transforming it into an arm of the Gestapo. After the large influx of foreign workers in the second half of 1942, especially from the conquered east, about 10 percent of them were weeded out as suspected “asocial and undesirable elements” in the words of one contemporary document. For those remaining, a jail with 20 cells was set up in camp IV, which housed Poles and eastern workers, and the cells were always full. For individuals in need of additional discipline and training in work habits, a “labor education camp” (*Arbeitserziehungslager*) was established on the initiative of the factory leadership in early 1943. Punishment was meted out especially frequently to the eastern workers, both men and women. In all, an estimated 12 percent of them were punished at least once between late 1942 and early 1944 for a variety of alleged offenses, mainly petty theft and work-related infringements (e.g., refusal to work and drunkenness on the job). Eastern workers were also far more likely than other national groups at Ludwigshafen-Oppau to be dispatched to concentration camps. In all, approximately 4 to 8 percent of the eastern workers were transported to concentration camps, a figure that was well over the rate for Poles (1.5 percent) and up to 24 times the rate for French and Dutch workers.²⁷⁶

In sum, then, there is no doubt that war production at Ludwigshafen and Oppau, like all other major German factories during the war, relied heavily on massive infusions of foreign laborers, most of whom were there against their will and/or under duress. Still, the percentage of the workforce at Ludwigshafen who were in this category of “forced and slave labor” (which also included a variety of workers in other categories, such as those on penal detail from the Wehrmacht and those lent by other firms) stood at 2.4 percent, one of the lowest figures of all of the major IG Farben plants, and not a single concentration camp inmate was used. In contrast, the proportion of such workers at Leuna was 5 percent, at Hoechst 8.5 percent, and at Auschwitz 26.6 percent.²⁷⁷ It appears, furthermore, that the foreign workers at the core Upper Rhine group plants were treated humanely within the context of available supplies of building materials and consumer goods, though eastern

²⁷⁶ Scharf, “Disziplinierung, Unterdrückung und Verfolgung,” pp. 6, 9–12, 14, 15, 37–8. Quotation from original document by Scharf, p. 12.

²⁷⁷ Kurt Hauptmann, “Eidestattliche Erklärung,” September 24, 1947, NI-11412.

workers in particular were treated more harshly owing to National Socialist racial policies.

That having been said, it is clear that key Upper Rhine group managers participated actively in the design and implementation of a disciplinary system that was particularly disadvantageous to the eastern workers of the foreign workforce. The enthusiasm of some managerial and technical personnel from Ludwigshafen and Oppau for implementing such systems, however, reached new and unfortunate levels at the plant in which they played so large a role, IG Auschwitz.

The Upper Rhine Group and IG Auschwitz

By late 1941 and early 1942, construction work at the IG Auschwitz-Monowitz plant was well underway. But its potential contribution to the war economy now seemed less important than it had when building work started in mid-1941. After all, by early 1942, short-term coverage of most war needs for synthetic fuel (from the plants that had been built up to 1942) and for buna rubber (from Schkopau, Hüls, and Ludwigshafen) appeared guaranteed. This perception resulted in a slightly decreased resource-allocation status for the Upper Silesian plant, though Auschwitz remained a key project for both the Third Reich and for IG Farben. What is more, the friendly relations between Otto Ambros and Heinrich Himmler ensured a very high priority in terms of allocation of inmate labor to the plant for its construction work.²⁷⁸

The number of inmates at the Auschwitz concentration camp increased rapidly from the spring of 1942, which entailed a rather large number of potential workers for IG Auschwitz. But, as mentioned in the previous section, the inmates had to travel each day – generally on foot – to and from the main camp to the IG site, several miles distant. The general consensus among the IG management was that this practice was inefficient, given the low productivity and high death rate of the inmates. There was thus considerable lobbying for the company to get permission to build its own camp near the factory construction site. After overcoming opposition, primarily from local SS officers, construction began in June 1942, and the camp was finished with the exception of a secondary perimeter fence by September. SS demands for still more facilities, such as a prison and a mortuary, along with problems in gaining the needed materials for finishing the camp, delayed its opening, but on October 28, 1942, the first 600 inmates arrived at the Monowitz slave labor camp. The camp, one of eight labor camps at IG Auschwitz (the others were for POWs, German laborers, or other civilian workers), eventually housed well over 10,000 inmates. It was run

²⁷⁸ Wagner, "IG Auschwitz," pp. 100–5.

by the SS, which had ultimate authority there and which determined both the organization and security measures imposed. But the IG paid for the camp's construction, and its managers clearly valued its labor. It was the first large concentration camp in Germany that was both privately funded and founded on the initiative of a private firm.²⁷⁹

The IG was, however, not at all responsible for the changing composition of the inmates in either the main concentration camp or their own related labor camp, which featured a large proportion of Jews after Hitler's order of July 1942 to make the Reich itself free of them (*judenfrei*). This order resulted in the massive transfer of inmates from camps in Germany and in the transportation of growing numbers of Jews from all parts of German-occupied Europe between 1942 and 1944. Nor were IG Farben personnel responsible for the concentration camp's further rapid expansion when the "final solution to the Jewish question" was implemented in Hungary in mid-1944. The pogrom sent hundreds of thousands of additional Jews to Auschwitz, where many of them were murdered quickly. But if ultimate responsibility for these actions lay elsewhere, the IG's managers and engineers on site adapted to the situation and participated with the SS in working inmates mercilessly, sometimes to death and in selecting people from their own concentration camp for gassing at the Auschwitz-Birkenau facility.

Further consideration of the IG slave labor camp at Monowitz at this point calls for an exploration of additional dimensions of the relationship between the IG (particularly the Upper Rhine group) and the gassing of inmates at Auschwitz. For both the concern and the group not only contributed to sending people to certain death, they also played a role (albeit a frequently misunderstood one) in providing the poison used in these murders – a delousing agent sold under the trade name Zyklon B.

Pursuing interests that Fritz Haber and BASF had had in pesticides during and after World War I (see Part I), research in that area continued at Ludwigshafen through the mid-1920s, leading to a way to produce a "high percentage" calcide, which concentrated cyanide poison to an unprecedented degree. The process was applied in the production of Zyklon B by a firm known as Degesch (Deutsche Gesellschaft für Schädlingsbekämpfung mbH). In mid-1930, the IG also became a co-owner of the firm with Frankfurt-based Degussa, and later in the 1930s the firm of Theo. Goldschmidt became a third partner. Ludwigshafen continued to have close ties with the firm through 1945, not least owing to its supply of other products sold by Degesch. For that reason first Curt Schumann, and after his retirement in mid-1940, Carl Wurster, sat on the administrative council (*Verwaltungsrat*) of Degesch.²⁸⁰

²⁷⁹ Wagner, "IG Auschwitz," especially pp. 125–6, 131, 132, 258–61.

²⁸⁰ "Die Geschichte der Degesch im besonderen das Verhältnis der IG wieder im besonderen das Verhältnis des Werkes Ludwigshafen und schliesslich von Dr. Wurster zur Degesch,"

The key issue in assessing the IG's involvement in this area revolves around the fact that Zyklon B, which constituted Degesch's most important product by far, was deployed by the SS at Auschwitz-Birkenau in gas chambers in which a huge number of (mainly Jewish) inmates were killed. It was the technological means of mass destruction of human beings, and many people have pointed to the fact that the IG – indeed Upper Rhine group – managers sat on the board of the firm that produced it.

But the culpability of these managers in this crime was actually quite limited. First, there is no evidence that Schumann or Wurster directly knew of the eventual application of the poison (which had a legitimate and well-regarded function in pest control long predating the war) to human beings. Second, though there was a jump in sales of Zyklon B from 1940 to 1941 and from 1942 to 1943, the new levels were not much higher than they had been before the gassing of concentration camp inmates had begun. In other words, the increase, to the extent that it would have been questioned at all by the members of the administrative council (who all had other positions that absorbed most of their energies), was almost certainly viewed as being related to the intensification of the war itself and the associated potential for disease, not necessarily to the implementation of racial policies. Finally, recent research has confirmed Wurster contention in the immediate postwar period: that Degesch was more closely aligned with the Frankfurt-based Degussa firm than with IG Farben.²⁸¹

Although the IG's culpability with regard to the supply of the gas used in killing inmates appears limited, there were other areas in which the concern was more clearly involved in the crimes of the Nazi regime. Indeed, the Monowitz concentration camp differed little from other SS-run facilities except that it was sponsored by the concern. SS guards ran the camp along racist criteria and freely engaged in brutality of all sorts. Inmates rose at 5 a.m. in summer and 6 a.m. in winter. They had one-half hour to prepare for their long working day, the first part of which lasted until noon. After a one-hour break, during which they could consume a lunch of "buna soup," the composition and nutritional value of which depended heavily upon the national or religious group to which particular inmates belonged, they went back to work until 6 p.m. in summer and 5 p.m. in winter. Marching back to camp, standing at attention while all prisoners were accounted for, and

December 18, 1947, especially pp. 2, 6, BASF UA W1/2/3; Joly, "L'implication de l'industrie," pp. 365–400, especially pp. 378–79.

²⁸¹ Joly, "L'implication de l'industrie," especially pp. 379, 386, 392–3; Hayes, *Industry and Ideology*, pp. 361–3; Hayes, "Degussa AG in the Third Reich: Gold, Gas, and the Misuse of Technological Capacities," presented at the conference of the Society for the History of Technology, Munich, August 18, 2000; for the postwar view of BASF/Wurster, "Die Geschichte der Degesch im besonderen das Verhältnis der IG wieder im besonderen das Verhältnis des Werkes Ludwigshafen und schliesslich von Dr. Wurster zur Degesch," December 18, 1947, p. 6, BASF UA W1/2/3.

eating a meager dinner left very little time for any other activity before lights out was signaled by 9 p.m. (9:30 p.m. in summer). All in all, the caloric intake of the inmates was on average 1,100 to 1,200 calories per day, far below what was needed, especially given the hard work they did. Not surprisingly, many of them fell ill, and a large number died. Although the numbers of deaths cannot be determined with any certainty, estimates that a total of 20,000 to 25,000 inmates succumbed at the IG concentration camp at Monowitz are probably reasonably accurate.²⁸²

One of the main reasons for locating a plant in Upper Silesia was that the area was initially beyond the range of Allied bombers. This fact, too, changed when the U.S. army and air force were able to establish bases in southern Italy in late 1943. By summer 1944, air attacks became a reality. The land war had become more threatening as well. Nevertheless, efforts continued to get the plant up and running, and it actually produced some methanol by spring 1944. A carbonization plant and a carbide furnace came on-line at about the same time. Nonetheless, rubber and fuel were never produced, even though a special battalion to push the work forward (*Stoss-Kommando*) arrived from Ludwigshafen in autumn 1944. The inmates who remained at IG Auschwitz were evacuated on January 19, 1945, and the plant itself was deliberately incapacitated so that it could not be used easily by the oncoming Russian troops.²⁸³

The Upper Rhine group was not directly responsible for the IG's activities at Auschwitz. Operational and financial decisions for the facility occurred at the level of the concern, with approval coming directly from its managing board. But the main technologies deployed, the design of the plant, and the personnel who undertook the planning, construction, and management of the facility stemmed almost exclusively from Ludwigshafen, Oppau, and Leuna. Otto Ambros and Heinrich Bütfisch, of course, were the most important figures here. But Walter Dürrfeld, the young and ideologically committed plant manager of the facility, also came from the Upper Rhine group, as did Max Faust, its chief engineer. The same was true for many of the salaried and technical workers who toiled beneath them. And when an emergency detail of personnel proved necessary in an attempt to complete parts of the plant in autumn 1944, it was no accident that the men came from Ludwigshafen.²⁸⁴

Auschwitz, a nondescript Polish town on the Vistula River, became the site at which the racial policies and practices of the National Socialist regime intersected with the technical ambitions of the Third Reich's leading corporation. The Upper Rhine group and its leading technical and managerial

²⁸² Wagner, "IG Auschwitz," especially pp. 132, 161–80, 238.

²⁸³ Ernst Struss, Affidavit, "Auschwitz," June 9, 1947, NI-7241, pp. 17–18, IWM, London; Wagner, "IG Auschwitz," pp. 327, 350–52.

²⁸⁴ Ernst Struss, Affidavit, "Auschwitz," June 9, 1947, NI-7241, pp. 17–18, IWM, London.

personnel played a vital role in the latter aspect of the fatal partnership. Legally, there was no connection between the group and the events at IG Auschwitz, especially after the maneuvering of the postwar period described in the next section. Morally, the situation was and is far more complex.

Destruction and Postwar Planning

As the war entered its final phase, destruction levels rose dramatically at the core Upper Rhine group plants, as did the frequency with which Allied bombers visited their terror upon them. By the end of 1944, “the [Ludwigshafen-Oppau] plant reported war damages of 98,681,457 RM... and had received reimbursement from the German government, including an advance of 50,000,000 RM to cover damages occurring in 1945.”²⁸⁵ In fact, by May 1944, reimbursements for damage constituted the second-largest source of income for the plants, and more than two-and-a-half times the next largest source of financing for the plants. Of course, the largest source of income continued to come from the IG’s central financing office.²⁸⁶

But the reach of Allied air power was soon to be matched by that of its land forces. The Normandy invasion took place in June 1944, and, despite difficult fighting during the summer of that year, the first Allied troops crossed into Germany by December. Given the location of the core Upper Rhine group plants, it was only a matter of time before they would be overrun.

It was in this atmosphere of growing gloom that Ludwigshafen’s August von Knieriem, IG Farben’s chief legal counsel and patent attorney and member of the managing board, prepared a memo contemplating the dismantling of the giant company. Von Knieriem recognized that it was likely that the postwar period would see a reaction to large firms (*Grossunternehmen*), and “we would be forced to break up our company.” He wished to begin preparing within the concern for such a possibility, suggesting two basic ways to divide it. First, a variety of subcompanies wholly owned by, or with special contractual obligations toward, the IG might be formed. The second possibility involved a more radical breakup of the concern. It was this second alternative that von Knieriem considered more likely, so it received detailed examination in his extensive memo.²⁸⁷

²⁸⁵ USSBS, Physical Damage Division, “IG Farbenindustrie, Ludwigshafen, Germany,” vol. I, 2nd ed. (April 1947), p. 7.

²⁸⁶ Fabrikbuchhaltung Ludwigshafen, “Finanzaufstellung Mai 1944,” June 13, 1944, BAL R 8128/A2421.

²⁸⁷ August von Knieriem, “Aufteilung der IG,” n.d. [end of 1944], pp. 1–2, quotation p. 1, BASF IG, A 281/1. Carl Wurster indicated after the war that there were earlier, serious plans to break up the concern: Wurster, “Die Neugründung der BASF im Zuge der IG Entflechtung und die Entwicklung der BASF 1945–1954,” July 15, 1954, pp. 6–7, BASF UA.

The IG's chief lawyer then went on to consider the advantages and disadvantages of such a division. The main advantages to a large corporation, he argued, were economies of scale, flexibility of financing, and significant financial clout, which entailed, in turn, an ability to withstand crises. On the other hand, there was a danger of bureaucratization and overspecialization. Central decision making also tended to take away responsibility and flexibility from those nearer the actual production process. All in all, then, there were limits to the advantages of size, and the question for von Knieriem was whether the IG was at an optimal point or whether it had gone beyond it. In fact, he explicitly mentioned that a radical breakup might be so advantageous as to make it worthwhile regardless of any outside interference.

But, he continued, a breakup was likely to ensue at war's end in any case owing to pressure from outside forces. The IG, he argued, should use its influence to ensure that a breakup would not be based on a regional model. Instead, the division should be along product lines. Thus, he suggested partitioning the IG into three corporations, the first comprising nitrogen, hydrogenation, methanol, isobutanol, and metals; the second, pharmaceuticals, plant protective agents, photographic supplies, spun rayon, artificial fibers, and perfumes; and the third, dyes, textile production aids, plastics, inorganics, and artificial rubber and related products. In other words, von Knieriem proposed a slightly modified version of the existing *Sparten*.²⁸⁸

Von Knieriem's thoughts in late 1944 created more questions than answers. But the memo clearly indicated the IG's top leaders' recognition that the concern was likely to end after the war and, because the Sherman antitrust act was mentioned in von Knieriem's deliberations, that the Americans were likely to have a major influence on the eventual structure. Despite these general preparations, however, no concrete action had been taken by the end of the war. In the meantime, the Allies were advancing toward the core factories on the Rhine. As spring 1945 approached, so did the Americans. Their imminent arrival signaled an end to strategic planning for the postwar period and a retreat into tactical reaction to swiftly changing circumstances, a situation that would last well into the postwar period.

The war itself was coming to an equally rapid conclusion. Rumors that American troops were on the way were circulating by mid-March 1945, and though they could not be confirmed officially, two events, one relatively private and one very public, could only be explained by the war's endgame. On March 19, 1945 Carl Wurster, as official leader of the Ludwigshafen-Oppau complex and as head of the local chamber of commerce and industry, was informed of the Führer's order to destroy the IG plants' production facilities, power plants, and raw materials reserves. Having successfully avoided extensive relocation of plant and raw materials in preparation for the war

²⁸⁸ August von Knieriem, "Aufteilung der IG," n.d. [end of 1944], BASF IG, A 281/1.

(see section 5), Wurster had experience with what he regarded as pointless orders, and he drew upon it in this case, too. He did not pass on the order and undertook no measures to implement it.²⁸⁹

The second event was clearly motivated by the anticipated arrival of the Americans. On March 20, 1945 the Rhine bridge connecting Ludwigshafen and Mannheim was detonated by German forces, cutting off the Rhineland Palatinate from the rest of the Reich. German troops remaining in the area were withdrawn to more defendable positions. The very next day, American troops rolled into the town of Oppau, and that evening the first telephone contact with Wurster was taken up by an American military official. In the meantime, the works' leadership faced a new crisis. Two of the four members of the IG managing board who were based in the complex, Martin Müller-Cunradi and August von Knieriem, were away from the plant – across the river in the main part of the Reich. Shortly before midnight on March 21, a government official indirectly communicated to Wurster and Ambros an order from Hans Kehrl, a powerful member of the government's economic planning organizations since the mid-1930s, to withdraw across the river and eventually to Berlin to work for the government in a technical capacity.

Wurster and Ambros quickly decided on a strategy for dealing with this decision. Wurster wrote to Carl Krauch at 1:00 a.m. on March 22 to inform him that he, Wurster, would not be following the order. He had not yet actually seen it in writing (it had been sent on March 17 but had not yet arrived). And the orders that he did possess indicated that the leader of a factory complex should be the last person to abandon it. Wurster argued further that he was needed by the workforce for the critical period to come.²⁹⁰ Ambros conceded that he, unlike Wurster, did not have the excuse of being the factory complex's leader and intimated that he feared reprisals against "our [presumably his and Wurster's] families, who sat on the German side [of the Rhine opposite Ludwigshafen]."²⁹¹ Less than five hours after Wurster wrote to Krauch, Ambros made his way across the Rhine in a small barge and eventually to Heidelberg, where his presence was made known to the authorities.²⁹¹

Clearly, much of Ambros's account was written with the postwar period in mind, as was Wurster's, so both versions should both be treated with some caution. But their general tenor rings true, and there is no doubt that Wurster remained as the only member of the IG managing board in Ludwigshafen

²⁸⁹ Carl Wurster, "Kurze Beschreibung der Ereignisse in den letzten Tagen vor der Besetzung von Ludwigshafen am Rhein durch amerikanische Truppen," draft, June 4, 1947, pp. 1–2, BASF UA, A 865/50.

²⁹⁰ Wurster to Krauch, March 22, 1945, BASF UA, A 865/50.

²⁹¹ Otto Ambros, "Ueber die Vorgänge anlässlich der Besetzung des Werkes Ludwigshafen am Rhein in der Zeit von 18. bis 22. März 1945," March 23, 1945, pp. 6–7, BASF UA, A 865/50.

to meet the Americans when they moved into the factories in earnest on March 23 and 24. Works security guards were directed to surrender their arms, and the Americans were shown around the plant, having been assured that it was not mined. Wurster was arrested on March 25 because of his continuing contacts with figures on the other side of the Rhine, but the Americans quickly decided that he was of more value to them elsewhere. On April 9 he was reappointed works director. He saw his task as lying primarily in putting his workers back to work, and he focused in particular on resuming production of fertilizers and other goods with immediate usefulness. Even before the armistice was signed, indeed in April 1945, Rhine-based plants of the former Upper Rhine group were delivering oxygen to the U.S. military to aid it in repairs of transportation systems, and the nitrogen plant was soon back in operation as well. Group personnel were also loaned to the Ludwigshafen administration to help get the city back on its feet.²⁹²

By summer 1945, the Americans issued an official order seizing the property of IG Farben. The order no longer applied to Ludwigshafen and Oppau, however, for in July the factories fell under French occupation authority.

8. FROM OCCUPATION TO REFOUNDRING, 1945–1952

Germany's defeat in 1945 marked the effective end of IG Farbenindustrie AG, though wrangles over how best to disentangle the affairs of the massive combine lasted into the early 1950s – and in some ways continue even today, particularly with the concern's legal successor, IG Farbenindustrie AG in Abwicklung (in Liquidation), or IGiA. For the Upper Rhine group, the period immediately after World War II was one in which its operations were forcibly scaled back to the original factories at Ludwigshafen and Oppau. Allied restrictions on production and R&D abruptly terminated the era of autarky-related adventures in synthetic fuels and synthetic rubber within the group.

Reduced to its pre-World War I roots, severely humbled in its highest-tech pursuits, and closely supervised by French occupation officials, the factories of the Upper Rhine group and their managers were forced to concentrate on traditional locations and more traditional product lines. The tasks they faced were daunting. They had to deal with the legacy of the National Socialist period and the war, which had moral as well as physical dimensions. They also had to deal with the legacy of the IG, which carried its own heavy moral burden as well as practical and profound commercial aspects. The most important commercial problems were the need to reestablish an effective sales organization and to reintegrate sales with production and research.

²⁹² Carl Wurster, "Kurze Beschreibung der Ereignisse in den letzten Tagen vor der Besetzung von Ludwigshafen am Rhein durch amerikanische Truppen," draft, June 4, 1947, pp. 1–2, BASF UA, A 865/50.

The Impact of the War on the BASF Factories

Owing in part to their location within easy striking distance of Allied bombers and in part to their centrality to the German war effort, the BASF factories in Ludwigshafen and Oppau suffered enormous physical damage. Of 1,470 buildings in the BASF core factories, one-third had been completely demolished; more than 60 percent had been partially damaged. Only 6 percent of all of the factory's buildings were intact, and 400,000 cubic meters of rubble needed to be cleared away.²⁹³ Ludwigshafen, with its closely spaced buildings of brick construction, generally sustained heavier blast damage than did Oppau, which featured more generously spaced steel and reinforced concrete structures. The same general description applied to the production plant of the two locations, which was rather fragile in Ludwigshafen and heavy-duty in Oppau.²⁹⁴ For both factories, however, the internal systems of transport, pipelines, water supply, sewerage, and electricity were all severely damaged as well. More serious still for the long-term viability of the factories, the war had destroyed much of their considerable R&D capacity.²⁹⁵

Work on clearing up this mess began after the last bombing raid on March 15, 1945, the arrival of American troops and tanks on March 21, and the last day of fighting at the plant on March 23. It was to continue through the arrival of French occupation troops, who replaced the Americans on July 6, 1945, and through the summer. Upon completion of the first stage of this operation, only about one-third of the plants' former productive capacity was intact. Work on repairing and rehabilitating the twin core plants of BASF continued for virtually the entire period covered in this section. As Carl Wurster pointed out to the shareholders of the recently reconstituted BASF in July 1954, "The 1952 business year was still characterized by energetic reconstruction." Workers "recycled" a considerable portion of the rubble at the factory, including nearly 6 million bricks and about 25,000 cubic meters of broken concrete, which was used as a "gravel" underlay for rebuilding factory roads.²⁹⁶ Taking advantage of the otherwise unwelcome

²⁹³ Peter Göb, "Notizen zu Bericht Dr. Fritz Müller 'Die BASF während des Krieges 1939–1945,'" pp. 2–3, BASF UA A 86/31b. Müller was the chief of air-raid protection at the Ludwigshafen and Oppau factories during the war. His report, also in this file, provides great detail on the attacks. His notes on attacks between 1943 and 1945 are available in United States Strategic Bombing Survey, Oil Division, "Ludwigshafen-Oppau Works of IG Farbenindustrie AG, Ludwigshafen, Germany," 2nd ed. (January 1947).

²⁹⁴ United States Strategic Bombing Survey, Physical Damage Division, "IG Farbenindustrie Ludwigshafen, Germany," vol. I, 2nd ed. (April 1947), p. 7.

²⁹⁵ Carl Wurster, "Die Neugründung der BASF im Zuge der IG Entflechtung und die Entwicklung der BASF 1945–1954," July 15, 1954, p. 17, BASF UA.

²⁹⁶ Carl Wurster, "Die Neugründung der BASF im Zuge der IG Entflechtung und die Entwicklung der BASF 1945–1954," July 15, 1954, pp. 13, 19, BASF UA, quotation from p. 19.

opportunity presented by destruction to buildings and equipment, the factory leaders streamlined the plant's physical facilities, applied new construction techniques, renewed rail links, and widened streets, especially at the older Ludwigshafen facility.²⁹⁷

The pressing need for cleanup and renewal transcended the merely physical dimension; it embraced abstract aspects as well. One of the most important nonmaterial facets was the organizational shakeup that resulted from the stated Allied policy of regarding IG Farben as an overwhelming concentration of economic power that had been instrumental in the German war effort and that would consequently have to be broken up. The Americans, who were in possession of Ludwigshafen, Oppau, Leuna, and most of the other IG Farben factories until July 1945, were the first to act. General Order No. 2 pursuant to Military Government Law No. 52 authorized American military occupation officials to seize the property and assets of the IG, to operate them in accordance with American policy, and to undertake "dispersion of the ownership and control of such of the plants and equipment seized under this order as have not been transferred or destroyed." It took effect on July 5, 1945. When the French took over Ludwigshafen and Oppau shortly thereafter, they followed the general tenor of this American document, enacting a similar law later in July. Then, Allied Control Council Law No. 9 of November 30, 1945 ratified the general policy for all four occupation zones, with retroactive effect to the date of the armistice in Europe on May 8, 1945.²⁹⁸

The precise way in which this policy would unfold was left in abeyance for most of the occupation period, and it constituted one of the key economic policy issues for both the occupying authorities and the rump German governments in the western zones of occupation until the early 1950s. In the immediate aftermath of the war, however, the IG was broken up *de facto* by virtue of the division of Germany into four more or less watertight zones of occupation. For the Upper Rhine group, this partitioning meant that the core factories in Ludwigshafen and Oppau were cut off completely from their sister factory in central Germany, the Leuna works. (As we have seen, however, the contacts between the core factories on the Rhine and the Leuna works had in any case become more sporadic and were limited for the most part to the technical and engineering side in the course of the 1930s and

²⁹⁷ Hans Bayer, "BASF – Das Werden eines Grossunternehmens," *Die BASF* 14 (1964): 187.

²⁹⁸ "U.S. Military Government General Order No. 2 pursuant to Military Government Law No. 52 (Blocking and Control of Property): IG Farbenindustrie AG," n.d., reprinted in Hoechst AG, *Dokument aus den Hoechst Archiven*, vol 48: *Die Verwaltung des Werkes Hoechsts 1945–1953* (Frankfurt-Hoechst: Hoechst AG, 1976), pp. 30–1; Lothar Meinzer, "IG Farbenindustrie AG. Nürnberger Prozess – Entflechtung – Liquidation," (December 1991), p. 1, BASF UA A 865/41.

during the war.) What is more, the Rhine-based factories were largely isolated for the foreseeable future from trade with other former facilities of the IG Farben, all of which lay in other zones of occupation.

Besides the Allied pressure for organizational cleanup and renewal, the occupation authorities also insisted on some sort of legal and moral accountability for the crimes against humanity in which it appeared that IG Farben had been complicit. Policy in this regard differed substantially from zone to zone, though all of the Allied forces insisted that prominent Nazis and war criminals be dismissed from their posts and that denazification proceedings determine who had or had not been associated with the party, and to what degree. The French, for example, were remarkably more liberal than the Americans, who lay at the other extreme. In any case, though, as can well be imagined, determination of party membership, identification of potential war criminals, and preparation of trials against them required gathering an enormous amount of documentation over a fairly long period. As a result, the Allies started their prosecutions against the most prominent suspected war criminals from the political arena, including people such as Hermann Göring and Albert Speer, at the International Military Tribunals held in Nuremberg. By the time it came to putting cases against industrialists, members of the legal and medical professions, and the bureaucracy, approximately two years had elapsed since the end of the war. By this point, only the Americans, many of whom remained determined to bring German industrialists to justice, still had the heart and the resources to press forward with trials. Again, only a few of the most prominent figures were brought before the courts.

The Nuremberg trial of former IG Farben executives began in late spring 1947. The 23 defendants included the 18 remaining former members of the trust's managing board of directors, the chairman of the supervisory board, Carl Krauch, and four lesser-ranking managers. They were charged with a variety of crimes, with specific counts grouped under the following categories:

- participation in a conspiracy to wage aggressive war;
- preparing and waging a war of aggression; plundering and spoliation in German-occupied countries; and
- use of slave and forced labor and participation in mistreating and murdering the enslaved workers.

Three of the defendants were also charged with membership in a criminal organization, the SS.

Just as personnel associated directly or indirectly with the Upper Rhine group were overrepresented in the IG when it was a going concern, so were they overrepresented among the defendants in the Nuremberg trial of former IG Farben executives. Krauch himself, of course, had at one time been the director of Oppau and had served much of his career within BASF and the Upper Rhine group. Carl Wurster, the *Betriebsführer* of the

Ludwigshafen and Oppau plants starting in 1938, a member of the IG managing board from 1938 to 1945, and the head of Ludwigshafen-Oppau in the immediate postwar period, was the sole active managing director of the factories of the core IG plants on the Rhine and Main who was brought to trial. He was singled out because he was the only one among their number who had also been a member of the IG managing board of directors before 1945. August von Knieriem had been highly placed in the former IG Farben, serving as the firm's chief counsel and as a member of the very narrow Working Committee of the managing board. Von Knieriem had come out of BASF and made his home and office in Ludwigshafen. Otto Ambros, who had been closely associated with the buna rubber programs and in particular with the establishment of an IG plant at Auschwitz, was also intimately connected with "the old Badische Anilin- & Soda-Fabrik," where he had had responsibility for organic chemicals production through the end of the war. Ambros in fact called BASF "my 'chemical homeland'" and also lived and worked in Ludwigshafen after the war.²⁹⁹ Heinrich Bütfisch had been a member of the IG managing board and head of the Leuna works, while Leuna's former chief engineer, Walter Dürrfeld, was placed on trial as a result of his post as construction manager at Auschwitz and the Monowitz concentration camp and as manager of the Auschwitz factory.

Other Nuremberg defendants associated with the Upper Rhine group included Heinrich Oster, a member of the IG managing board and the head of the Nitrogen Syndicate. Hermann Schmitz, the chairman of the IG Farben managing board from 1935 to 1945, had started his career at BASF in Ludwigshafen. The same was true for Christian Schneider, the former chief of *Sparte I*, who had risen quickly within the firm by virtue of his activities as head of the Leuna works and eventually as the overall chief of IG Farben's manufacturing plants. Some other connections were more indirect. Fritz ter Meer, for instance, had been most closely associated with the Lower Rhine group (Bayer) for most of his career, but through his direction of the buna program – which owed so much to the Upper Rhine group – he had also been associated with the Upper Rhine group's activities.

When the verdicts were passed down at the end of July 1948, all were acquitted of the charges involving aggressive war and the three defendants so charged were found innocent of membership in a criminal organization. Thirteen of the men were found guilty of one or both of the other counts against them (plundering and spoliation on the one hand and use of slave and forced labor on the other) and were sentenced to jail terms ranging from 18 months to 8 years. The defendants implicated in IG activities at Auschwitz were punished with heavier sentences than those who had plundered and despoiled foreign industry in German-occupied areas. As can be imagined,

²⁹⁹ Otto Ambros, "Gedanken zu meiner Verurteilung durch das Nuernberger Gericht am 29./30. Juli 1948," October 1948, p. 2, BASF UA W 10/1.

the defendants associated with the Upper Rhine group, which had played a major role in planning and constructing the Auschwitz plant, were more likely than others to be found guilty, and among those found guilty they were likely to have higher sentences. Of the previously noted group of men, only Wurster, Schneider, and von Knieriem were acquitted. On the other hand, of the seven defendants who received relatively heavy sentences of between four and eight years imprisonment, only two (Fritz ter Meer and Georg von Schnitzler) were not directly associated with the Upper Rhine group.

The end of the IG trial had four implications for the former Upper Rhine group. First, the trial and the verdicts seemed to demonstrate the limits of the influence that directors of individual factories could have on overall policy within the trust. After all, Wurster, whose activities were restricted primarily to the Ludwigshafen-Oppau plants, was acquitted on all counts against him. Otto Ambros, it is true, received a sentence of eight years' imprisonment and along with Walter Dürrfeld had the dubious distinction of having the longest prison sentence of all of the IG executives. But Ambros's punishment was as a result of his association with the buna program, especially at Auschwitz, not of his activities in Ludwigshafen.

Second, the trial and its verdicts appeared to draw a line under the legal responsibility of former high-ranking officials in the trust. For many Germans in particular, those who had been responsible had been brought to justice, and the others could proceed unencumbered with rebuilding their factories and their industry. Third, the end of the Nuremberg IG trials also had the effect of allowing the breakup of the trust into successor firms to move forward. There were still many items to discuss and decide in this regard, but the perceived resolution of some key legal issues helped set the stage for the establishment of the successor companies. Finally, the end of the trial freed Carl Wurster in a very literal sense to proceed with directing the course of reconstruction and resurgence at the BASF core factories.

This is not to say that questions about BASF's moral, legal, and financial responsibility for the IG's actions, especially for IG Auschwitz, ended when the verdicts were handed down in July 1948. Ludwigshafen was faced with claims that it was legally liable for paying contractors' bills for the Auschwitz plant and other facilities in the east such as Heydebreck and Pöllitz, because the work had been commissioned by personnel at the Rhine-based plant on behalf of the IG Ludwigshafen had also been the site where financial arrangements – including bank loans – were made to support expansion programs undertaken in Auschwitz. Again, there were claims that BASF should take responsibility for paying back the outstanding bills and loan balances.³⁰⁰

³⁰⁰ "Aktennotiz über eine Besprechung betreffend Abwicklungsfragen von Luranil, Anorgana sowie der Ostwerke Heydebreck und Waldenburg," March 5, 1946, BASF UA B 4/1571; Deutsche Industriebank an die IG Farbenindustrie AG, Ludwigshafen, "Betr.:

Disputes over these issues continued well into the postwar period. Working in Ludwigshafen under the direction of Otto Ambros, a team that included the lawyers Wolfgang Heintzeler and a Mr. Dilthey helped set up an Auschwitz Liquidation Office (*Abwicklungsstelle Az*) in November 1945, which was then removed from BASF to Mosbach in Baden in an attempt to reinforce spatially the firm's insistence that it was not responsible for Monowitz. The Liquidation Office was subsequently moved to Frankfurt. In early 1946, while still in Mosbach, it sent out a form letter, deliberately without any person's name on it, to builders and suppliers of Monowitz informing them that the property of IG Farben had now been confiscated and that payments could proceed only with the permission of occupation authorities. The letter requested them to avoid further letters of inquiry or notices of warning about the consequences of nonpayment and to send the Office a statement of account retroactive to January 1, 1944, so that records could be checked.³⁰¹

In stark contrast to this attempt at legal and financial dissociation, however, BASF ruled that the personnel who had been seconded from Ludwigshafen to Auschwitz would remain employees of the core Upper Rhine group factories. The situation with regard to those from other factories in the east was more complicated. Although many of them had withdrawn to Ludwigshafen after their own factories were overrun, they were working "in Lu[dwigshafen] only on a temporary basis, but were not fully affiliated with the BASF."³⁰²

Despite this attempt to create legal distance, some of the people who were owed money for work done or supplies delivered to Monowitz continued correspondence with BASF Ludwigshafen in an effort to gain payment. The Deutsche Industriebank, which had lent IG Farben in Ludwigshafen RM 16 million for expansion of the Auschwitz plant, demanded its money back in a series of letters as late as 1949. In the summer of the following year, the French control officer for the BASF plants wrote on behalf of the Allied High Commission to announce the dissolution of the Auschwitz Liquidation Office in Frankfurt. He asked BASF to take over the archive of the Office as

Investitionskredit Querschnitterweiterung Auschwitz," October 6, 1942 (Abschrift von Abschrift, streng vertraulich), BASF UA B4/1573. On the general decision to locate liquidation offices away from BASF factories, see "Aktennotiz über eine Besprechung betreffend Abwicklungsfragen von Luranil, Anorgana sowie der Ostwerke Heydebreck und Waldenburg," March 5, 1946, p. 2, BASF UA B 4/1571.

³⁰¹ "Abwicklungsstelle A, "Besprechungsbericht," November 16, 1945; IG Farbenindustrie AG Abwicklungsstelle Az, "Betr.: Bau-, Montage-, und Lieferfirmen des Werkes Auschwitz," 1946 (ca. February); both in BASF UA B 4/1573.

³⁰² "Aktennotiz über eine Besprechung betreffend Abwicklungsfragen von Luranil, Anorgana sowie der Ostwerke Heydebreck und Waldenburg," March 5, 1946, p. 2, BASF UA B 4/1571; Abwicklungsstelle A, "Besprechungsbericht," November 16, 1945, B 4/1573.

well, as the archivist responsible for it, because Ludwigshafen “had assumed the direction of the Auschwitz factory at the time.”³⁰³

In all cases, BASF pursued the same strategy of distancing itself legally from the claims. The company’s lawyers admitted that Ludwigshafen had served as the base from which orders were made and loans borrowed on behalf of Auschwitz and many other factories in the east. But they claimed that the Upper Rhine core factories had done so on behalf of IG Farben, not their own. The prospective placement of the Auschwitz archive (and archivist) at Ludwigshafen set off particular alarm bells. BASF attorney Wolfgang Heinzeler joined one of the company’s accountants in writing a passionate, and ultimately successful, letter fending off the plans of the Allied High Commission. For one thing, they argued, the Ludwigshafen plant possessed no archival materials of its own on Auschwitz that might support or supplement those in the Liquidation Office’s archives. They insisted, furthermore, that the claim made in the control officer’s letter about Ludwigshafen’s relationship to Auschwitz is not accurate. The Auschwitz factory was an independent unit, both administratively and in accounting terms, and was equivalent in rank to the Ludwigshafen factory; the factory leadership at Ludwigshafen thus had no authority whatsoever to issue orders of any kind to the Auschwitz factory. It was true – and very much to the chagrin of the Ludwigshafen leadership – that the Ludwigshafen factory had to send personnel to Auschwitz to some degree in the construction phase (just as the Leuna works and various other factories of the IG did). But this requirement did nothing to change the fact that the Auschwitz factory represented an independent unit that was not subordinate to Ludwigshafen.³⁰⁴

As is typical in such disputes, there were exaggerations and misunderstandings on both sides. Legally, the position of BASF seems to have been clear. The Upper Rhine group, and Ludwigshafen in particular, supplied personnel and ideas to Auschwitz only under duress. At the same time, the relationship with Auschwitz was closer than Heintzler and other Ludwigshafen employees argued. It was no accident that the core BASF factory served as the focal point of financial and commercial activity with regard to the notorious works in the German-occupied area of Poland. It was also somewhat disingenuous to argue that other factories “such as Leuna” supplied personnel to the plant. Leuna was, after all, very closely associated with the Upper Rhine group at the time in terms of traditions and technical personnel!

Ludwigshafen’s attempts to distance itself from Monowitz legally and financially even before the end of the war in 1945 were paralleled, quite

³⁰³ Correspondence between Deutsche Industriebank and Ludwigshafen from 1949; *Der Kontrolloffizier* (M. Bouvot) to Director of Finance and Administration, BASF, August 17, 1950; both in BASF UA B 4/1573.

³⁰⁴ BASF to Administration (M. Crugot-Lemonnier), “Abwicklungsstelle Auschwitz,” September 8, 1950, BASF UA B 4/1573.

naturally, by measures to remove itself morally as well. They created a certain tension, however. On the one hand, there was genuine pride taken in the contributions that the Upper Rhine group had made to the planning and design of a highly modern, integrated chemical plant. For instance, one assessment of the IG efforts at Auschwitz pointed out that, though the plant was located there because of the war situation and the availability of raw materials and water, it had great potential for peacetime chemical production:

*It was decisive in the development of this factory that the two most important industrial research centers of the German chemical industry, Ludwigshafen und Leuna, placed all of their know-how and processes at the disposal of the newly established works in order to bring them to large-scale technical maturity. The intention was realized in Auschwitz because it was there that acetylene and ethylene chemistry met up with the chemistry of carbon monoxide/hydrogen syntheses. In my view, it is in this combination that the chemical-technical future lies.*³⁰⁵

As time went on, this inherent tension was resolved as the desire to attain moral distance outweighed the wish to gain technical kudos. Writing in October 1948 after being sentenced to eight years in prison for his role in Auschwitz, Otto Ambros carefully refuted responsibility for the decision to locate the plant in Auschwitz and for the crimes committed there. Even at this point, however, his line of argument reveals the pride in the Upper Rhine group's technical achievements (which, as the document written in 1948 indicated, were supposed to culminate in the Auschwitz facility):

As World War II came to an end, I had the hope of being able to work again on my own initiative along the lines that had been possible in Germany before the time of the totalitarian economy of the Third Reich. In the course of many interrogations by Allied expert colleagues, I developed a hope that in the realm of science and technology initially the boundaries between peoples would fall. The work that had been accomplished in the past years – even though it was connected to armaments – actually did find expert recognition from the former enemy.³⁰⁶

Given the judgment against Ambros at Nuremberg, it was clearly much more important to establish clear moral distance. The IG leaders had thought they could fulfill the government's aim of increased output of synthetic rubber by constructing a third major production facility at Ludwigshafen, something Ambros and ter Meer had suggested to the Reich Economics Ministry in October 1940. The government, however, had insisted on an additional production site beyond the range of Allied bombers.

³⁰⁵ "Zur Gründung des Werkes AUSCHWITZ in Oberschlesien," July 2, 1945, p. 16, BASF IG, A 251/4. Emphasis in original.

³⁰⁶ Otto Ambros, "Gedanken zu meiner Verurteilung durch das Nuernberger Gericht am 29./30. Juli 1948," October 1948, p. 1, BASF UA W 10/1.

Ambros claimed that the decision in favor of Auschwitz proceeded from the government and that it was implemented by the IG only under the duress of an “emergency situation” (*Notstand*): “The fourth buna plant came about against the will of IG Farbenindustrie and on the orders of the Reich.”

Ambros also argued that his choice of Monowitz had owed partly to the insistence of the authorities and partly to his technical and economic judgment. Considerations of labor availability had played a role in this decision, but not the existence of a concentration camp. Rather, he asserted that the labor market had been bad everywhere in Germany at that point and that it had actually been better in Upper Silesia than elsewhere, for the hope had been “to gain the voluntary services of the Polish population in Upper Silesia and from Polish border districts for the construction period.” In meetings with the authorities, IG Farben had, according to Ambros, actually insisted again and again on “*German labor...*,” and indeed for technical reasons as well and to offset the many foreign workers.” Finally, he emphasized that “*the initiative to use inmates of the concentration camp* lay unambiguously and exclusively with state authorities.” Ambros maintained that the conditions under which the workers at the IG construction site lived and worked were better than those in the main camp once this decision had been made and implemented. He went so far as to claim “that the Auschwitz construction site stood at the top within IG Farbenindustrie in terms of its outlays in the social arena.”³⁰⁷

The arguments made by Ambros differed little from those put forward by his defense attorney at the Nuremberg trial, and in the years that followed they became the constant refrain of executives from the successor companies, particularly BASF, when questions about IG Auschwitz were asked. The fact that such accusations of complicity in criminal activity still resurface again and again indicates that the firm’s portrayal of its role has not been completely convincing to many, at least not in moral terms. The process of legal distancing from Auschwitz has had more success, not least owing to the creation in the early 1950s of IGiA as the legal successor to the trust when the concern was broken up and the successor companies re-established. Part of IGiA’s task has been to seek restitution of and/or compensation for the properties lost (primarily those in the east) as a result of the postwar political settlement. But it also has served as the focal point for legal action by former forced laborers of the IG plants, especially those who had toiled in Auschwitz. Such proceedings continue to the present day.

It was through IGiA that Norbert Wollheim, a Jewish former inmate of Auschwitz who had worked at the IG site in Monowitz, brought a civil suit against the IG in November 1951. The third district court in Frankfurt

³⁰⁷ Otto Ambros, “Gedanken zu meiner Verurteilung durch das Nuernberger Gericht am 29./30. Juli 1948,” October 1948, pp. 9–10, 21, 27, BASF UA W 10/1. Emphasis in original.

am Main issued its decision on June 10, 1953. The court conceded that the inmates at Monowitz had stood under the control not of the IG, but of the SS, and stated explicitly that the hearings had clearly demonstrated “*that the IG had not intended to treat the workers in an inhumane manner.*” In fact, it was clear to the court that the managers of the trust undoubtedly would have preferred not to use inmates of the concentration camp in its workforce.³⁰⁸ Nevertheless, the judges ruled, once the inmates had been accepted as laborers at the IG construction site, regardless under which circumstances, the trust had had a duty to care for them. And in this responsibility it had been negligent.

On this point, the arguments of defense witnesses about limited responsibility actually backfired. The judges held the IG responsible for failing to name anyone from the Auschwitz plant to the IG managing board. (Ambros and Bütfisch, the members in charge of the Upper Silesian plant, were located in Ludwigshafen and Leuna, respectively.) After all, Auschwitz had more than 30,000 employees and was “a city in itself,” which, the court argued, “speaks...against [the IG’s claim that it met its] duty of care.” It might also be true, as argued by the defense, that no one had known about the selection and killing procedures adopted by the SS. But IG managers *should* have known “if they had paid attention to the fate of their workforce.” The court found the defendants’ repeated statements that the task of acquiring such knowledge “was not my responsibility” were nothing more than “ugly excuses.” Even the excuse that the trust’s managers could have faced severe consequences if they had resisted the SS was found wanting by the judges:

After extensive investigation...the court has come to the conviction that the defendants, if they had seriously wished,...were to a certain degree in the position to mount resistance against the SS.

This conviction is based in the first instance on the previously cited announcement of November 3, 1942, according to which the SS ‘was notified’ that the defendants had assumed responsibility for providing food to inmates. This is not the language of a subordinate, let alone a fearful subordinate, in dealing with his superior. Instead, it is much more the language of, at the very least, someone of equal, if not superior, even vastly superior, rank.³⁰⁹

Having found the IG’s defense inadequate in key respects, the judges decided that the concern had not done its duty to protect the health and

³⁰⁸ Judgment by the Third Division of the Regional Court (*Zivilkammer des Landesgerichts*) in Frankfurt am Main, June 10, 1953, pp. 11–12, BASF IG, A 865/58, quotation from p. 11; emphasis in original.

³⁰⁹ Judgment by the Third Civil Division of the Regional Court (*Zivilkammer des Landesgerichts*) in Frankfurt am Main, June 10, 1953, BASF IG, A 865/58, quotations in previous paragraph from pp. 34, 32, 34, 35, 39–40, respectively.

well-being of its employees and awarded Wollheim DM 10,000 plus 4 percent interest from July 1, 1951. The costs were to be borne by the defendant.³¹⁰

Naturally the outcome of the civil suit sent tremors throughout German industry. If such payments, small as they might be for a particular individual, were to be made to all forced laborers, the costs would be enormous. IgiA lawyers made a prompt appeal to overturn the decision and turned to the German state for a legislative resolution to this issue. In the meantime, the liquidators began negotiating with the Conference on Jewish Material Claims against Germany for an overall resolution to the issue. In early 1957, the IGiA agreed to pay DM 30 million into a fund set up by the Conference to be distributed among former forced laborers, though the former IG did not accept any legal responsibility for its actions in doing so. Ninety percent of this total was earmarked for distribution to former forced laborers who were Jewish.³¹¹

Although legal responsibility for the activities of the IG in Auschwitz was effectively shifted away from BASF AG, accusations of moral responsibility and claims for financial compensation have continued to dog this successor company. Although the Upper Rhine group had been acting on behalf of the concern as a whole and although Auschwitz had not formally been part of the group, the group's connection to the plant at Monowitz was very close, primarily by virtue of the technologies, engineers, and managers employed there. Undoubtedly, recognition of this responsibility has been a main reason that BASF AG has taken the lead in putting together the coalition of German firms to establish the German Economy Foundation Initiative Steering Group "Remembrance, Responsibility, and the Future"³¹² in more recent years.

Production and Investment under French Occupation

In terms of production, technology, and investment, the arrival of the French occupiers on July 6, 1945, marked the beginning of one of the most difficult and unusual periods in the history of the BASF group. Regardless of what the ultimate policy and practice was to be for the group – a very uncertain matter in the initial occupation period – all actors recognized that clean-up

³¹⁰ Judgment by the Third Civil Division of the Regional Court (*Zivilkammer des Landesgerichts*) in Frankfurt am Main, June 10, 1953, p. 11, BASF IG, A 865/58.

³¹¹ IG Farbenindustrie AG i.L. to the Higher Regional Court, 5. Zivilsenat, Frankfurt a.M. in Sachen Norbert Wollheim, November 16, 1953; IG Farbenindustrie AG i.L. (Reuter/Schmidt) to the Federal Finance Ministry, attn: Herrn Min.Rat Kuschnitzki, August 13, 1953; both in BASF IG, A 865/58. Lothar Meinzer, "IG Farbenindustrie AG," December 1991, p. 3, BASF UA A 865/41; Spoerer, *Zwangsarbeit unter dem Hakenkreuz*, p. 248. See also the material on Mark Spoerer's home page, <http://www.uni-heidelberg.de/~www570a/spoerer/firms.htm>. (Accessed September 4, 2001.)

³¹² The URL for the foundation is: <http://www.stiftungsinitiative.de/>. (Accessed September 4, 2001.)

must continue in earnest and that it would have to coincide with efforts to rebuild and modernize the factories. It was a task as daunting as it was unprecedented, for BASF as well as for the other IG successor companies.

All other things being equal, the French occupiers might have been expected to be stricter and more punitive than the American or British occupation authorities. France, after all, had been defeated and partially occupied by the Germans. The German chemical industry, and most importantly IG Farben and the Upper Rhine group within it, had taken advantage of the situation to establish dominance over key parts of the French chemical industry through forced contracts favorable to the Germans. Massive numbers of French workers had helped keep the factories operating – often under duress – during the war.

Initial French policy did indeed aim squarely to punish and exploit their zone and “their” part of IG Farben. Occupation officials expressed their strong desire to control and contain the zone’s chemical industry, and they encouraged French chemical producers to step into export gaps left by the handicapped German chemical industry – and to use German plants, materials, and know-how to do so. Many of these resources, the officials suggested, might be taken from BASF, whose factories constituted more than 50 percent of the revenue from the French zone’s chemical industry and a good 10 percent of Germany’s entire chemical industry.³¹³

But the French were also less prepared than the other Allies to take over their own zone of occupation – no small wonder given that France had only recently been liberated from German occupation. They made up for this disadvantage by pursuing an unrivaled degree of centralization in policy making and control in their zone and by assigning more occupation officials to the chemical industry than the other Allies did in their zones of occupation. At the beginning of the occupation, French control officers located at the BASF factories alone numbered over 100, a far higher number than at any other former factory complex in the western zones of occupation. Drawn mostly from the French chemical industry, the officials continued to work on-site in groups of similar size as late as mid-1948. By the end of that year, the total sum of administrative officers responsible for the chemical industry in the French zone dwindled to 20. By comparison, the American zone had just three such officers in mid-1948.³¹⁴

³¹³ “Etude de la politique à suivre vis-à-vis des industries chimiques allemands,” n.d. (ca. mid-1945), MG Fr C 98, 2049/14; “Compte-rendu du Congrès IG-Chimie,” April 19, 1947, MG Fr C 98, 1840/45.

³¹⁴ “Französisches IG-Interesse,” *Wirtschafts-Zeitung* (Stuttgart), July 16, 1948, seen in Zeitungsausschnittssammlung des Instituts für Weltwirtschaft, Keil; S/Dir des Ind. Chim., “Compte-Rendu de visite au Bipartite Control Office,” June 6, 1948; J. P. Fouchier, “Note pour le Chef de la Div. de la Prod. Ind., Renseignements concernant la situation des personnels anglais et américains,” June 20, 1949, both in MG Fr C 98, 1838/36; Fouchier, “Evolution du contrôle de l’industrie chimique en Allemagne,” June 2, 1949, MG Fr C 98, 2871/7.

Many officers in this large contingent of personnel initially intended to exploit the German chemical industry for the purposes of French economic reconstruction and development and to control the industry in order to contain the country's ability to wage war. On this score, the French differed from the other western occupation authorities in only two ways: the degree to which attempts at exploitation of the industry in their zone constituted a main thrust of policy, and the scale of their efforts to implement this aspect of policy. Yet, like all of the other Allies, the French soon discovered that the best way to achieve these objectives was anything but clear. In modern warfare, as in peacetime, many of the key products of the chemical industry – especially of BASF – were equally vital to economic success. The French also soon realized that “exploitation” of the firm and its industry might take many forms, ranging from the seizure of physical plants to the seizure of production, information, and know-how.

The French were not the only ones to think – or act – with regard to the latter kind of confiscation. From the earliest days of the Allied occupation, teams of technical investigators swarmed around Germany, collecting scientific and technical information for use in Allied countries, particularly in industry. As can be imagined, the chemical industry, especially that in Ludwigshafen and Oppau, were favored destinations for these teams seeking “intellectual reparations.” Reppe chemistry, for instance, was a major target. Combined with wartime seizures of German patents, this effort was certainly aimed at enhancing the competitive prospects of Allied firms at the expense of their German counterparts. Science- and research-intensive firms such as the IG and its successor companies were especially vulnerable in this regard. Historians and contemporary writers have estimated that the value of this information – a loss to German firms and a profit to their Allied counterparts – amounted to billions of U.S. dollars. Technical exploitation certainly cost BASF and many other German companies dearly. On the other hand, such forfeiture was not always obvious or complete. In the fast-changing chemical industry, new products and processes often quickly replaced those taken. More importantly, however, impounded patents, apparatus, and/or technical information were frequently useless without the know-how and tacit knowledge to turn them into operational technologies. That expertise was largely retained by the people who continued to work and research at BASF, and it was an important reason that the firm was able to re-establish contacts quickly with its foreign counterparts. Know-how was frequently a bargaining chip in negotiations to acquire the most modern and efficient technologies from abroad.³¹⁵

³¹⁵ Gimbel, *Science, Technology, and Reparations*, *passim*. On the difficulty of estimating losses for the chemical industry in particular, see Stokes, “Assessing the Damages: Forced Technology Transfer and the German Chemical Industry,” pp. 81–91, in Ciesla and Judt, eds., *Technology Transfer Out of Germany after 1945*.

As far as policy within the French zone was concerned, the French occupation authorities decided on an approach subtler than simple seizure of goods or ideas. It centered on gradual rehabilitation and reconstruction of the BASF factories for the purpose of producing for the French economy. In other words, the French decided not to kill the goose that might lay the golden egg. The French occupiers, especially those at Ludwigshafen and Oppau, were keener on restoring production in their zone's chemical industry than the British and Americans were in their own zones. The French were also more successful at it. They encouraged the German factory leadership to pursue plans to rationalize production, particularly when it came to redesigning the transport and materials-handling systems within the plants. By June 1948, the month of the West German currency reform, chemical manufacturing in the French zone had regained 91 percent of its prewar rate. In the combined British and American zones, it languished at just over half its 1936 rate.

Regardless of their intentions, the French control officers "thought in terms of getting BASF back into production to stay. This involved by implication running the firm as any German manager would have done."³¹⁶ Moreover, regardless of initial policy and intentions, it soon became clear to many of the French occupation authorities that the problems confronting the BASF factories in the war's immediate aftermath made the value of punitive practices questionable. Destruction of the installations at Ludwigshafen and Oppau far exceeded that at any other IG plant of similar size or importance, and what was still intact was often worn out from intensive wartime production programs. Acquiring money to repair this damage and modernize the factory was extremely difficult and often even impossible. The Allies had seized the assets of IG Farben, and the component firms had no direct control over its bank accounts. Money was obtainable only with Allied permission. Coal, which was vital as both an energy source and a raw material in the German chemical industry of the time, was generally either scarce or inaccessible (being located largely in other zones of occupation). Supplies of various chemical intermediate and starting materials were equally tight. But if raw materials and intermediates were hard to come by, markets for the products of the BASF plants were virtually nonexistent. Former internal IG markets were affected by zonal division, and access to external markets was hampered by the lack of a sales organization and by extensive bureaucratic controls by the Allies.

Step-by-step, French policy and practice therefore changed, though the reasons for and the pace of the shift are somewhat controversial. In 1954, Carl Wurster claimed that changes in personnel within the French sequester authorities eventually brought about "a much more sympathetic stance . . . ,

³¹⁶ Stokes, *Divide and Prosper*, pp. 96, 103, quotation from p. 103.

which, among other things, made it possible to rebuild normal business connections with the French economy.”³¹⁷ Bernhard Timm, Wurster’s deputy (and later chairman of the BASF managing board) and the man at BASF who had the most to do directly with the French occupation authorities, went much further than this description, insisting in 1985 that “there was neither friction nor tensions with the French.”³¹⁸

In fact, both men exaggerated somewhat, though Wurster’s emphasis on incremental, piecemeal change is more accurate than Timm’s depiction. As late as summer 1948, for instance, newspapers reported that the French were considering replacing the large contingent of personnel overseeing the BASF facilities with a 21-person administrative directorate (*Verwaltungsrat*) consisting of 18 French and 3 Germans. The French dominance in this directorate was to be used to reinforce the small stake the French government had in IG Farben, and thus in BASF.³¹⁹

Despite this evidence of lingering punitive policies from the initial occupation, it is clear that the French authorities were slowly disengaging themselves from a regime of reprisals against and exploitative control over BASF. Instead, they evolved into somewhat advantaged business partners of the German firm. Probably by the time of the currency reform in June 1948, and certainly by the time financial controls over BASF were lifted in late 1949, the tide had turned in favor of the Germans and of BASF. Indeed, this metamorphosis in the relations between the French occupation authorities and the Germans reflected the dynamics in the postwar status of the victors and the vanquished generally in Europe. In the face of political and economic developments, the absolute control exercised by the Allies during the early occupation period slowly gave way to the resumption of German authority.

As we have already seen, output of goods at Ludwigshafen and Oppau expanded considerably and quickly after the war. Despite the shortages of financing and coal (the two major engines of the chemical industry’s development to that point), production levels at the BASF factories continued to grow, especially in areas of traditional strength such as nitrogen and methanol. During the early phase of occupation, however, output of finished goods depended heavily upon what little coal was available. It had been unthinkable before the war to operate plants of this size without reserves of at least two months, but Ludwigshafen and Oppau produced with minimal stocks in the initial postwar period. Although this practice led to

³¹⁷ Carl Wurster, “Die Neugründung der BASF im Zuge der IG Entflechtung und die Entwicklung der BASF 1945–1954,” July 15, 1954, p. 18, BASF UA.

³¹⁸ Based on an interview with Timm as quoted in Ludmann-Obier, *Die Kontrolle der chemischen Industrie*, pp. 168–9.

³¹⁹ “Französisches IG-Interesse,” *Wirtschafts-Zeitung*, (Stuttgart), July 16, 1948; “Die Zukunft der Badischen Anilin,” *Handelsblatt* (Düsseldorf), October 12, 1948, both seen in Zeitungsausschnittssammlung des Instituts für Weltwirtschaft, Kiel.

wide fluctuation in production levels, they had leveled out considerably by 1948.

In the financial and political situation that existed in postwar Germany, a factory could increase output only by cannibalizing existing machinery and parts and by intensively using existing and substitute raw and intermediate materials. Because the buildup to the war and the war itself had stretched resources to the breaking point, further stretching resulted in catastrophe. On July 28, 1948, just over one month after the currency reform, an explosion ripped through the Ludwigshafen factory, killing more than 200 people, injuring up to 3,000, and destroying an estimated 15 percent of the site's capacity. It was determined later that the cause had been the bursting of a railroad tank car containing dimethyl ether.³²⁰ Regardless of its origins, the tragedy was severely disheartening to everyone working at the BASF core plants. Besides mourning the loss of life, personnel were forced yet again to start the arduous task of removing debris, restoring damaged facilities, and constructing the plant anew.

The brevity of the interval between the explosion and the verdicts handed down in Nuremberg on July 29–30 suggest a connection between these events and the alterations in French policy and attitude. The cataclysmic blast demonstrated the futility of policies directed solely at exploitation and underscored the extent to which Ludwigshafen and Oppau were underresourced. Crucial, too, was that Nuremberg judgment in the IG Farben trial, though a devastating indictment of the actions of key managers from the Upper Rhine works group as a whole, acquitted Carl Wurster, the previous factory manager at Ludwigshafen-Oppau. Wurster was therefore able to resume his prior position immediately, and he continued in this post until the 1960s. More generally, the fact that the Nuremberg judges found all of the defendants innocent of charges related to pursuit of aggressive war changed the ground rules of the breakup of IG Farben. From this point forward, the IG breakup became less a moral crusade than a legal matter, though it was to last for several more years.

If the end of the IG Farben trial in Nuremberg and the explosion reinforced the trend among the French occupiers to be more accommodating toward the needs of the firm over time, there was one area of occupation policy that continued to cause enormous friction into the 1950s. Acting on the Allies' agreement to limit future war potential in Germany in part through reparations and removals, the Inter-Allied Reparations Agency targeted specific plants and equipment within Germany. The idea was to match them with the needs of Allied countries and/or countries that had been affected by Axis aggression.

³²⁰ Alfred von Nagel, "Produktionsentwicklung in der BASF von 1945 bis 1950," *Die BASF* 1 (January 1951): 18; W. von Haken, "Die Katastrophe von Ludwigshafen," *Angewandte Chemie* B20 (September 1948): 244–5.

Most major firms were directly affected to some degree by this dismantling policy. The BASF factories, with their various large-scale synthesis plants and other specialist apparatus, were high on the wish lists of recipient countries, and in the view of Allied authorities also represented surplus capacity with which to meet civilian requirements in many cases. The total prewar value of the plants affected through April 1949 was RM 40.1 million, which was deemed to correspond to a value of DM 17.1 million at that time. Although there were 24 installations slated for removal from the BASF plants, a handful of them – including the buna synthetic rubber facility and plants for producing ammonia, a methanol production unit, and one for manufacturing isobutanol – accounted for fully 90 percent of the current value.³²¹

Dismantling was carried out by teams directed by British and American rather than French authorities, and these teams were completely unrelated to the military government in the French zone. They caused considerable consternation and irritation on the German side, especially in the wake of the 1948 explosion. The fact that most of the facilities either served the French economy or helped cover vital local needs meant that plans for dismantling were continually postponed, as happened in August 1948. However, in May 1949, as the occupation was approaching its end and intensive preparations for the establishment of the Federal Republic were underway, the western Allies decided that it was time to move forward. The order was issued for immediate implementation of dismantling plans, which would affect the synthetic fuel and buna plants as well as parts of the nickel, chlorine, methanol, and nitrogen facilities at Ludwigshafen and Oppau. Intensive dismantling began during the same month, and the buna and synthetic fuel facilities were completely removed. In November 1949, however, as a result of the Petersberg Agreement, the Allies and the West Germans agreed to a much more limited dismantling program. All major ongoing dismantling operations were stopped at Ludwigshafen and Oppau, except for parts of the methanol and ammonia facilities.

The dismantling program might well have done real damage to the fledgling company's prospects for recovery. Most of the losses, including the expensive buna works, caused some pain, but "did not endanger the existence of BASF," especially because it proved possible to have the related acetylene production facility removed from the reparations list. The seizure of heavy chemical capacity – especially ammonia production facilities – may have affected the factories much more deeply but for the fact that the Allies, encouraged by the French, developed ways of ensuring that only plants needed elsewhere were in fact dismantled and that sufficient capacity remained intact on-site. Although the dismantling lasted into 1950, it proved

³²¹ "Demontage-Vorhaben der BASF – nach Mitteilung der französischen Militärregierung vom 21.4.49," November 8, 1949, Institut für Weltwirtschaft Kiel, Wirtschaftsarchiv, FIX200 E.

possible to limit its effects so that “in no case [was] consumption in our own factory or the supply of other industries endangered.”³²²

Saving as much plant as possible from dismantling and cleaning up and modernizing the factory had important functions, of course. But they were in a sense only preconditions for the primary activity that would keep BASF in business – and ultimately prosperous – over the long haul: actually earning money through sales of the firm’s products. The domestic market was important, but, for BASF and the other IG successors, the export market was vital. It was also essential for the health of the western German, and eventually West German, economy.

Chemicals had always figured as a major export earner in Germany, accounting for 15 percent of total sales abroad even in the autarky year of 1937. Germany’s early postwar chemical industry felt the brunt of Allied production and export restrictions more than other sectors, and it accounted for only 6.9 and 8.2 percent of total exports in 1948 and 1949, respectively. With the founding of the Federal Republic and the gradual freeing of restrictions on the chemical industry, exports rebounded substantially. Chemical exports more than doubled in a single year (1949–1950) and continued growing apace during the decade that followed, with the 1959 level being nearly five times that at the beginning of the decade.³²³

BASF’s exports rebounded earlier than those of the other two major western German successors, Hoechst and Bayer. Between 1946 and 1948, BASF earned between 17 and 18.5 percent of its total revenue through sales abroad, whereas its two rivals did not sell anything to foreign buyers in 1946, and their sales abroad still lagged well under 10 percent through 1948. Still, most of BASF’s “sales abroad” during 1946 and 1947 amounted to supplying the French economy with needed wares at knock-down prices. In 1948, goods were sold in other foreign markets, though the French one remained the most prominent one. By 1951, however, BASF’s output was sold in a variety of foreign outlets, and all three major successors to IG Farben were earning approximately one-third of their vastly expanded income from foreign sales.³²⁴ The BASF group’s earnings from export were therefore well on their way to recovery, though they still lagged far behind Ludwigshafen’s prewar export earnings quota of 60 percent of the IG’s total sales revenue.

One of the main challenges in reaching this goal was that the former BASF had had no sales organization of its own since 1931. Instead, sales were

³²² “Die Badische Anilin nach der Amputation,” *Deutsche Zeitung und Wirtschafts-Zeitung* (Stuttgart), April 8, 1950, seen in Zeitungsausschnittssammlung des Instituts für Weltwirtschaft, Keil.

³²³ Arbeitsgemeinschaft der chemischen Industrie, *Tätigkeitsbericht*, 1950, pp. 31–2; *ibid.*, 1951, pp. 41–2; *Chemiewirtschaft in Zahlen*, 4th ed. (Düsseldorf: Econ, 1960), p. 29.

³²⁴ Alfred von Nagel, “Produktionsentwicklung in der BASF von 1945 bis 1950,” *Die BASF* 1 (January 1951): 18; “Gesamt-Umsätze,” n.d. (ca. 1952), Bayerwerksarchiv, Leverkusen, Finanzwesen Gesamtumsätze, 15.D.2.

centralized in Frankfurt at the IG Farben headquarters, with offices in Berlin selling the goods produced in the IG *Sparte* I. Sales offices abroad for the export trade were owned and operated by the IG, not by the component factories. This arrangement also applied to contractual and personal connections with sales agents in foreign countries.

BASF, like the other IG successor companies, therefore started the postwar period in an especially precarious position. What is more, the company's poverty prevented large-scale investment in this vital area, even though the government's foreign exchange restrictions were less stringent than they had been. Still, at the first opportunity, BASF representatives journeyed abroad to establish – or rather more often to re-establish – contacts that had been lost during the tensions of the 1930s and during the war itself. European countries were one of the first destinations, constituting as they did (and still do) one of the most important export markets for BASF. They could be reached relatively quickly and with virtually no outlays in foreign exchange. Bernhard Timm, who eventually became the deputy chairman of the BASF managing board, remembered traveling to Holland during the early 1950s and having to make sure that he and his colleagues ate and paid for their lunch before they crossed the border.³²⁵ Trips further afield were even more difficult. But the American market, and even more so American technology, were considered so vital to the future prospects of the firm that it was necessary to go to the United States as often as possible, even if it meant (as it often did) begging and cajoling the government for permission to spend the foreign exchange necessary for the trips. A few members of the BASF staff managed to make the journey in the late 1940s. By the early 1950s, there were more and more trips abroad, not just to Europe and America but to Latin America and the Far East as well.

There were two major reasons that BASF was able to gain a foothold fairly rapidly in all of these markets and to set up a functioning international sales organization on that basis. First, the company had operated in these markets on its own prior to 1930, and to some extent could draw upon experience and contacts from that period. Second, and even more important, the technological capabilities of the firm were so highly respected that its representatives easily gained access to potential partners in technological development and sales ventures. They also often knew those partners personally, either from the prewar period or from the Allied technical missions that visited Ludwigshafen and Oppau immediately after the war. A corollary was that BASF's products were known to be of high quality and thus found a ready market. In autumn 1953, for example, two BASF engineers visiting a number of key sites of the American petrochemical industry registered their concern at how they might be received, but they "soon perceived that

³²⁵ Author's interview with Bernhard Timm, Ludwigshafen, August 10, 1988.

the ‘Badische’ has a good name” even in the United States.³²⁶ The actual establishment of sales offices specializing abroad in BASF products, not to mention the founding of subsidiaries outside Germany, occurred for the most part in the period covered in the final part of this book. In 1949 Italy became the first country abroad to have a sales organization for BASF, but sales organizations in all other major countries in Europe and North America did not come about until the mid- to late-1950s.

BASF simultaneously needed to rebuild and overhaul what had always been one of its strongest features, even in the IG period – its world-renowned R&D capability. The related buildings and equipment had been largely destroyed during the war, and the company’s research capacity had been further compromised by Allied technical investigation teams. Carl Wurster and his staff devoted considerable time and scarce resources to reconstruct and re-equip laboratories and other research facilities at the plant. In 1954, taking stock of this effort, Wurster noted:

We have, in the final analysis, spent millions on these facilities in the clear knowledge that, without these expenditures, we would simply have strangled the company in its development and would made its comeback impossible. For it is certainly true that a very important part of our current turnover comes from new developments that have occurred in the laboratory and in the factories in the postwar years.³²⁷

In particular, the continuation of promising work on polymerization allowed BASF to develop new products, demand for which was increasing spectacularly during the 1950s and beyond.

The Workforce and the Re-emergence of Labor Unionism

By 1945, foreign workers of various sorts (including POWs, workers employed by foreign firms, and forced laborers) accounted for over two-fifths of the 23,524 total workers employed at Ludwigshafen and Oppau.³²⁸ At the end of the war, they were released to find their way home, and many German workers disappeared. So it was with a vastly diminished workforce that BASF set about clearing rubble, rehabilitating plants, and restarting production. The exact size of the workforce at that time is uncertain however. A number of official reports produced by BASF in the postwar period claim

³²⁶ Günther Daumiller and Rudolf Keller, “Eindrücke einer Reise in den Vereinigten Staaten von Nordamerika im Herbst 1953. Referat im Hauptlaboratorium am 1. März 1954 und Besuchsberichte,” p. 17, BASF UA, F9/39. More generally, see Stokes, *Opting for Oil*, Chapter 4.

³²⁷ Carl Wurster, “Die Neugründung der BASF im Zuge der IG Entflechtung und die Entwicklung der BASF 1945–1954,” July 15, 1954, p. 17, BASF UA.

³²⁸ Calculated on the basis of figures presented in table BASF Personnel Department (from VT, *Der Mensch in BASF*), BASF UA, C 621/2, and from contemporary tables in C62205: Sozial Entwicklung. Arbeiterstand 1897–1946. BASF UA.

that the once mighty factories, which in their heyday in 1943 and 1944 employed well over 30,000 workers, began operations again in May 1945 with around 800 workers.³²⁹

It is a striking image and a good story, but also quite likely a gross exaggeration. Company archival sources indicate a total of 9,000 blue-collar workers employed at Ludwigshafen and Oppau in July 1945, with almost two-thirds of them working at the former site. By 1946, the number of workers had grown to 13,485, with a total staff (including salaried and academic personnel) of 21,800. By the time BASF was refounded (1952), that figure for Oppau and Ludwigshafen had approached 27,000, exceeding the level in 1928 (26,000).³³⁰ Approximately 8,000 additional staff were employed by the Gewerkschaft Auguste Victoria, a coal mine in the Ruhr District that was a 100 percent subsidiary of BASF.³³¹

Though it may be a gross exaggeration to say that the number of people working at BASF had dropped to the hundreds rather than the thousands in the immediate postwar period, the firm was able to hold on to so many employees partly because it was able to supply them with small amounts of additional rations. The misery and abject poverty of the time must not be forgotten. In the city of Ludwigshafen, one-half of all prewar accommodation had been destroyed, and in some parts of the downtown area the figure ranged between two-thirds and three-quarters. Once boasting a population of well over 100,000, Ludwigshafen in May 1945 had just 61,000 inhabitants (numbers that could be ascertained much more accurately than usual thanks to rationing). By October 1946, however, the city had grown to 108,000 and had thus regained the status of a city (*Großstadt*), partly because of reconstruction and hiring at BASF.³³² Wurster and BASF also aided this recovery through secondment of personnel to help run or reconstruct vital services.³³³

³²⁹ See, for instance, Hans Bayer, “BASF – Das Werden eines Grossunternehmens,” *Die BASF* 14 (1964): 187. Wurster makes the same claim in “Die Neugründung der BASF im Zuge der IG Entflechtung und die Entwicklung der BASF 1945–1954,” July 15, 1954, p. 13, BASF UA.

³³⁰ Compiled from figures presented in table BASF Personalabteilung (from VT, *Der Mensch in BASF*), BASF UA, C 621/2, and from contemporary tables in C62205: *Sozial Entwicklung, Arbeiterstand 1897–1946*. BASF UA; Dr. Rötger, “Umsatzanteil pro Belegschaftsmitglied,” n.d., BASF IG, T 01; “Die Badische Anilin nach der Amputation,” *Deutsche Zeitung und Wirtschafts-Zeitung* (Stuttgart), April 8, 1950, seen in Zeitungsausschnittssammlung des Instituts für Weltwirtschaft, Keil.

³³¹ “Die BASF nach der Neugründung,” *Deutsche Zeitung und Wirtschaftszeitung* (Stuttgart), April 4, 1953, seen in Zeitungsausschnittssammlung des Instituts für Weltwirtschaft, Keil.

³³² Braun, *Schichtwechsel*, p. 115.

³³³ Carl Wurster, “Kurze Beschreibung der Ereignisse in den letzten Tagen vor der Besetzung von Ludwigshafen am Rhein durch amerikanische Truppen,” draft, June 4, 1947, pp. 1–2, BASF UA, A 865/50.

Those employees still remaining at BASF in spring 1945 took the opportunity offered by the American takeover of their plants to re-establish works councils based on the Weimar model, which had been banned under the National Socialists. This action was the renaissance of German labor organization, which culminated in the reinvigoration of the trade-union movement. Although it had clear roots in the Weimar period, the new movement exhibited broader consensus and more moderate policies than had its forerunner of the 1920s. Within a short time most workers at BASF were organized in a single trade union. In fact, nearly three-quarters of BASF workers were unionized by the end of January 1948. Most of them were members of what eventually became the Industriegewerkschaft Chemie-Papier-Keramik (IG Chemie), which, in turn, became affiliated with the German Trade Union Federation (Deutsche Gewerkschaftsbund, or DGB) in the autumn and winter 1949–50.³³⁴

The French assumption of control over their zone of occupation, and therefore of the BASF factories, did nothing to stop this growing level of unionization. The French saw worker organization as aiding them in achieving their aim of reaping maximum economic benefit from their zone of occupation. The unions, the French thought, would also serve as force for political stability and as a useful counterweight to the factory leadership.³³⁵ In fact, though, resurgence of trade union membership was accompanied by an unprecedented sense of solidarity among employers and employees, who were united against the occupiers, especially with regard to the dismantling policy. This solidarity extended to other areas as well. For instance, the BASF workers laid down their tools for an hour on August 20, 1947 in protest against the trial of their works director, Carl Wurster, in Nuremberg.³³⁶ The experience of their plant's rehabilitation and of their united opposition to the occupiers helped forge the relatively high degree of labor-management peace that characterized much of the 1950s and 1960s.

The Breakup of the IG Farben Trust and the Refounding of BASF

All of these developments at the “local” level of the BASF factories and the French zone took place against the broader backdrop at the German and international level relating to the breakup of the IG Farben trust.³³⁷ The following brief summary of the process relates for the most part directly to the reconstitution of BASF AG in 1952.

³³⁴ Braun, *Schichtwechsel*, pp. 121–7.

³³⁵ Lattard, *Gewerkschaft und Arbeitgeber in Rheinland-Pfalz*, especially p. 293.

³³⁶ Braun, *Schichtwechsel*, pp. 117–18, 129–130.

³³⁷ For detailed treatment of this subject, see Kreikamp, “Die Entflechtung der IG Farbenindustrie A.G. und die Gründung der Nachfolgegesellschaften,” pp. 220–51; Stokes, *Divide and Prosper*.

With control and exploitation as the initial policy aims of the French occupation authorities, their decision in July 1945 to treat “their” portion of the IG – primarily the core BASF factories at Ludwigshafen and Oppau – as a single unit made technical and economic sense. The British pursued a similar tack (though for different reasons) with regard to the factories of the former Lower Rhine group (Bayer) in their zone. Thus, the process of breaking up the IG in the western zones was heavily prejudiced from the beginning toward keeping the former works groups more or less intact. Only the Americans seriously considered radical deconcentration of the Main Valley group (Hoechst) in their zone. They even went so far as to contemplate splitting up the main factory of Hoechst itself into independently owned and operated production units.³³⁸

The devil lay in the details. Precisely which factories would be counted as forming the successor companies of the works groups? Which company would get what assets of the former concern? How were the chemical giant’s patents and overseas holdings to be dealt with? What mechanism would allow the former giant to meet its liabilities and legal obligations (including potential lawsuits from creditors and forced laborers)? How would shareholders of the IG be compensated for the breakup of their firm? The Soviets thought they had answers to all of these questions and proceeded to nationalize the IG units in their zone without compensation, mainly to produce for the needs of the Soviet economy. Unsurprisingly, it was not long – spring 1948 at the latest – before the vast differences between the Allied approaches had ended all semblance of four-power cooperation on the breakup of IG Farben.

In the meantime, the British and Americans had decided to combine their zones of occupation into the Bizonal at the beginning of 1947. Their co-operation extended to the control and breakup of the IG, two aims that were formalized in August 1948 with the formation of the Bizonal IG Farben Control Office (BIFCO) and a parallel German organization, the IG Farben Dispersal Panel (FARDIP). This entry of a strong German partner into the deliberations marked a new stage in the proceedings, which were henceforth characterized by increased levels of German participation and influence through to their completion in the early 1950s.

At first, the French pursued their own policies with regard to the BASF factories and held the other two western Allies at arm’s length. They retained controls on financial transactions and exports until the end of 1949, much longer than the Bizonal did. Yet they also made concessions to the need for policy coordination, appointing Dr. Heinz Krekeler as the chief negotiator and liaison with the Bizonal. Later a consul-general for the Federal

³³⁸ Richardson Bronson to Control Officer, “Request by Mr. Martin for consideration of dispersal by industries,” January 21, 1946, reprinted in *Dokumente aus Hoechst-Archiven* 49: *Der Hoechst Konzern entsteht*, Teil 1 (Frankfurt-Hoechst: Hoechst, 1978), pp. 19–20.

Republic of Germany in New York, Krekeler had himself been part of the Upper Rhine group, joining Oppau as a chemist in 1934. During the war, he became assistant to the works manager at a newly erected gasoline synthesis plant at Heydebreck. In his new, postwar position, Krekeler maintained close contacts with the French authorities, and the occupiers clearly placed a substantial amount of trust in him and his judgment.³³⁹

By 1950, after the creation of the Federal Republic and the transformation of Allied control through the creation of the Allied High Commission (AHC), the occupation policies of the French had begun to converge with those of the British and the Americans in both form and substance. In August, AHC Law No. 35 provided the legal basis for the stock transfers that eventually broke up the former concern, and the French joined the American and British BIFCO organization to form the Tripartite IG Farben Control Group (TRIFCOG) to implement the law. The German side was strengthened in the final negotiations through the presence of officials from the Federal Ministry of Economics, who acted on the basis of advice from a small group of men representing powerful interests in banking and the chemical industry. Included in this group was Hermann Abs of the Deutsche Bank, who subsequently became the first chairman of the BASF supervisory board.

Through the end of 1950, significant differences in detail still existed between the Allied and the German suggestions on the breakup of the IG, but all the participants agreed with FARDIP's concept of *Kerngesellschaften*, or core companies. These successors to the IG would be far smaller than the trust had been, but would also be of sufficient size and strength to compete on the world stage. Looking back in 1954, Carl Wurster described the German tactics in the process this way:

The real political objective of the German influence on the breakup of the IG could not be the reconstruction of the old IG . . . [Instead,] the German aim in the IG breakup was to establish new and viable units on the basis of the IG property remaining in the Federal Republic, [units with] enough size and structure to be competitive nationally and internationally in the chemical industry. They would thus correspond to the federal government's economic policy concept, which was characterized by competitiveness and a market economy.³⁴⁰

Wurster went on to claim that there were still serious suggestions by Allied experts in late 1950 to break the Ludwigshafen-Oppau complex into a number of small firms, though there does not seem to be much evidence of this intention. Whatever the case, the force of practice during the occupation of Germany and the growing strength of German interests had combined

³³⁹ Memo from Randolph Newman to Kelleher, "Subject: Dr. Heinz Krekeler," June 28, 1950, BA Koblenz, OMGUS BICO Dec. 11/11-2/8; correspondence between Krekeler and French occupation authorities is in MG Fr C 98, 539/C45-46.

³⁴⁰ Carl Wurster, "Die Neugründung der BASF im Zuge der IG Entflechtung und die Entwicklung der BASF 1945–1954," July 15, 1954, pp. 6–7, BASF UA.

by 1950 to make the retention of Ludwigshafen and Oppau as a single productive unit in the context of a unified successor company one of the few uncontroversial aspects of the trust's breakup. In this context, one might share Curt Schuster's contention that "the IG has remained an episode in the history of BASF."³⁴¹ But it was much, much more than that.

BASF, its personnel, and its associated factories put a strong and unmistakable stamp on the giant concern throughout its existence. Some of the reasons for this influence were deliberate and finely calculated. After all, Carl Bosch was one of the main proponents of founding the trust in the first place, not least to attempt to spread the costs of his firm's ambitious project to derive oil from coal at world market prices. And it was Bosch's ideas of organization and efficiency that drove the establishment of the characteristic divisional structure of the IG.

But most of the reasons for BASF's disproportionate influence on the development of the trust were accidental, or at least beyond its control. The Depression – given the influence of BASF-related personnel (including Bosch) and their refusal in general to give up on the oil-from-coal project – drove the concern further and further into the arms of the state in search of protection and subsidies. When the National Socialists came to power, they offered the group additional enticements that its technical personnel found impossible to resist, especially if those attractions helped them realize their ambitious technological dreams. In a sense, then, the Upper Rhine works group was a victim of its own success. Autarky policies stretched its personnel resources and design capability to the limit, reinforcing centrifugal tendencies that the IG's organizational evolution had engendered within the group. Those policies also drew the group into ever closer collaboration with the regime and its belligerent and racist policies, which culminated in IG Auschwitz. Be that as it may, however, the *real* victims of the group's success were the innocent people who were maltreated and worked to death at Auschwitz and elsewhere in the pursuit of reprehensible racist ideals and questionable technological ambitions.

The IG placed its stamp on the BASF as well. Through the 1960s, most of the firm's top management team had come of age within the trust and identified to some extent with it. This vital aspect of their identity was symbolized perhaps most clearly in the meetings of "the members of the managing board of the former IG Farbenindustrie AG." Wurster hosted the third such meeting in February 1959, where he welcomed Carl Krauch, Mrs. Carl Bosch, and Messrs. ter Meer, Gajewski, Ambros, Ilgner, Schneider, Bütfisch, Mann, Kühne, and Jähne along with many of their wives. Wurster sat at the head of the U-shaped table, with the managing board chairman from each of the IG's other two major successor firms – Ulrich Haberland of Bayer and Karl

³⁴¹ Schuster, *Badische Anilin- & Soda-Fabrik AG*, p. 30.

Winnacker of Hoechst – sitting at its ends.³⁴² For these men and their wives and for many of those who toiled in less elevated positions within the firm, the IG period continued to be remembered as a time of comradeship and exciting technological and organizational challenges, even if the successor companies competed fiercely with one another.

The IG period also placed a completely different stamp on the leaders of BASF. Although they may have looked back fondly on some of the old times, they were also forced to realize that there were limits to a path guided by technological and productivist considerations alone. Certainly, it remained central to the culture of BASF to be at the forefront of international chemical technology. But the balance between technological, commercial, and human considerations had been recalibrated, and the scope of the dreams of the firm and its leadership had been scaled back to more modest, more humane dimensions.

³⁴² Table seating plan for third dinner meeting of “die Herren Mitglieder des Vorstandes der ehemaligen IG Farbenindustrie,” February 6, 1959, Ludwigshafen, BASF UA, W 1/2/8.

IV

BASF Since Its Refounding in 1952

Werner Abelshauser

I. THE PAST HAS A FUTURE: LAUNCHING BASF ANEW The Refounding

Operationally, January 30, 1952, was a day like any other at the Ludwigshafen and Oppau plants of IG Farbenindustrie. Though the trust was being dissolved, production had been running at full capacity since the beginning of a worldwide boom triggered by the Korean War. The plant's 26,415 employees were completely occupied trying to meet the rapidly burgeoning domestic and international demand and to eliminate the last production obstacles remaining from war damage, the catastrophic explosion in July 1948, and the postwar program of industrial dismantling in Germany. The number of personnel still lagged behind the peak of 37,400 reached in 1943, but it already clearly exceeded the prewar level of 23,500 recorded in 1938. Turnover had soared accordingly, with exports accounting for one-third of the company's sales. When the "founders" and the members of the supervisory board designated by them toured the complex before notarization, they could not fail to see that it was already well on the rise again and thoroughly capable of participating in the expected expansion of the markets. Like other veterans of the old BASF, Alwin Mittasch, Carl Bosch's former colleague and long-standing director of Oppau's ammonia laboratory, was visibly overwhelmed by all the evidence "of the irrepressible vitality inherent in our beloved Badische Anilin- & Soda-Fabrik."¹

Against this background, Carl Wurster, too, found it difficult to adequately describe the complexity of breaking up the trust and of observing proper protocol when greeting the founders and supervisory board members who had appeared for the re-establishment of BASF. He therefore opted "to address everyone present as admirers and friends of old madam BASF, who despite her more than 80 years of age is now showing again that she is constantly rejuvenating."² Wurster himself served as a responsible managing board member of the Badische Anilin- & Soda-Fabrik (IG Farbenindustrie

¹ Alwin Mittasch, "Tafelansprache" [dinner address] January 30, 1952; BASF UA, C 31/1.

² "Aufzeichnung über den Verlauf des Gründungstages der Badischen Anilin- & Soda-Fabrik Aktiengesellschaft," January 30, 1952; BASF UA, C 31/1.

AG “in Liquidation”) and had headed the upper Rhine operating group of IG Farbenindustrie AG as the plant manager since 1938. The banker Hermann Josef Abs, the German federal government’s commissioner for the re-establishment of BASF, embodied the continuity that overlay this “refounding.” He had represented the Deutsche Bank on the supervisory board of IG Farbenindustrie AG and for that very reason thought it “actually a bit odd to refound an 85-year-old enterprise of world repute.” Also unable to escape this impression of “eternal youth” and “youthful vigor,” Abs, who had just been elected chairman of the supervisory board, attributed the purpose of the act of refoundation to the intention “of ending a state of emergency that has lasted now for nearly seven years.” The president of the German Marshall Plan bank (*Kreditanstalt für Wiederaufbau*) thereby reduced the meaning of the ceremonial to the restoration of corporate legal structures, especially the supervisory board, that had broken away since the confiscation of the works in 1945. Abs hoped that the managing board would regard the reconstituted supervisory board in particular “not as an inhibiting element but rather as a helper and supporter.” Wurster assured him that BASF’s plant management had always understood itself “all these years” to be only a “trustee” and saw the refounding as “the basis for a normal corporate form of existence.”

Not a word was said that day about the actual reason for refounding BASF – the eventual disincorporation of the former Upper Rhine group from the total assets of IG Farbenindustrie AG that were being liquidated. The exact modalities of the divestiture were still up in the air, and the works remained under French control. The dinner to which Abs had invited his colleagues in the *Gesellschaftshaus* (the company’s social, meeting, and reception center) was attended by Simon Lazard, the former sequester who had just been elected to the supervisory board of the new BASF and who was still the acting deputy chairman of the administrative council of the IG Farben works in Ludwigshafen and Oppau; the local representative of the military administration; and another representative of French industrial policy in Germany, Jean-Pierre de Fouchier, the French member of the Tripartite IG Farben Control Office (TRIFCOG). De Fouchier surely viewed the purpose of the breakup differently than did the Germans who were present, but he did not mention the past in his toast to the “celebration of BASF’s revival.”³ He underscored the role of outstanding figures as the “seed of good future cooperation,” primarily meaning Abs and Wurster, whose “unusual partnership” and “indissoluble ties with BASF’s greatness” had impressed him. He also included Lazard, whom he praised as a *bonne acquisition* for BASF. Above all, he told the gathering he had just received the news “that the [Allied] High Commission raised no objections to the newly appointed

³ Attachment to BASF UA, C 31/1.

members of the supervisory board and the managing board." The project of refounding BASF had cleared its first hurdle on the evening of January 30.

The day of the ceremony had begun at 9:30 a.m. when the five founders of the new stock corporation gathered in the meeting room of building D 100. Abs and Mittasch were joined by two respected auditors – Edmund Kappes, the managing board chairman of the Süddeutsche Revisions- und Treuhand AG, Mannheim, and Franz Merkle, the spokesman for the Schwäbische Treuhand AG, Stuttgart – as well as by Leopold Freiherr von Schrenck-Notzing as the representative of BASF's old Stuttgart group of founding shareholders. They were prepared to put up DM 20,000 of BASF AG's total preliminary share capital of DM 100,000, a contribution that would meet the regulations of the German Stock Corporation Act, according to which the formation of a stock corporation required the participation of at least five persons with a share capital totaling at least DM 100,000.

Before concluding the contract, the founders and Wurster received the members of a delegation from the works council, who wanted to explain why the workers' representatives did not want to accept the invitation to have two of its members take seats on the "supervisory board of the 100,000 DM stock corporation."⁴ The chairman of the works council, Ernst Lorenz, took great pains to stress "that our position not be taken as an expression of no confidence in the plant manager, Dr. Wurster, and the other members of the plant management, for cooperation between us has been exemplary in the past seven years since the collapse." He believed, however, that the "willingness to communicate" could be enhanced best if "the partnership envisioned in critical times were to be realized in the organs of the final company." Lorenz was referring to the current domestic policy debates about the Labor-Management Relations Act of 1952, in which the unions were fighting for plant structures modeled on the legislation that had established industrial democracy in the steel and coal sector in April 1951. That act mandated equal employee representation in the supervisory boards of the industry. Most of the parties in the Bundestag, the lower house of Germany's federal parliament, did not want to extend this ruling to the rest of the economy and were resolutely determined to limit employee representation in the supervisory boards outside the coal and steel industry to one-third of the seats. BASF's works council did not want to prejudice the political debate by accepting a minimalist position before the labor-management relations bill cleared the Bundestag. (The version reserving one-third of the supervisory board seats for employee representatives was finally passed on July 19, 1952.) Nevertheless, the works council offered the freshly elected supervisory board and the managing board its willingness to cooperate, "provided that this willingness exists on your side as well."

⁴ "Stellungnahme des Betriebsrats der B.A.S.F. Ludwigshafen, a. R.," January 30, 1952, attachment to BASF UA, C 31/1.

Abs regretted the reluctance of the employee side but did promise to keep the works council informed about the preparatory work to raise capital and bring the BASF enterprise into the new corporate entity setup to receive the IG Farben holdings slated for distribution. However, “the information, by its very nature, cannot be as extensive as would be the case if two representatives of the works council . . . were to share the responsibility for further development.”⁵ Lastly, it was arranged for all four members of the delegation – Ernst Lorenz, the chemist Dr. Friedrich Becke, the manager Erich Day, and the security expert Rudolf Hoffmann – to sit with two other employee representatives on the 18-member supervisory board, which was established after completion of the refounding process on March 28, 1953.

The works council was not the only actor to be wrestled with when it came to distributing the seats on the first supervisory board in the period before BASF was refounded. Both the French authorities and the German federal government proposed candidates acceptable neither to the managing board nor to Abs as the “re-establishment commissioner.” The French side doggedly pressed for the election of Egon Freiherr [Baron] von Ritter, a partner of the Munich banking house Merck, Finck & Co. This persistence only tended to deepen BASF’s reserve toward the banker, with whom no one in Ludwigshafen had or wanted any personal or business dealings. Von Ritter’s merits obviously lay in his work for the IG Farben Dispersal Panel (FARDIP), to which BASF attached less value than the French did. When the stance in Ludwigshafen hardened, de Fouchier at last relented and ceased pushing von Ritter’s candidacy.⁶

Another proposed candidate on the list from the German Federal Ministry of Economics likewise left Wurster cold: Max von Hellingrath, the president of the Bavarian Staatsbank (state bank). Though this bank was one of those with which BASF did most of its business, and although its local manager was even the first among equals as the spokesman of the consortium formed by these banks, the members of BASF’s managing board abided entirely by the tradition of IG Farbenindustrie in their desire to keep the banks from wielding too much power on the supervisory board. Wurster considered the banks on the board to be represented well enough by Herman Josef Abs, stating that with him “the future supervisory board of BASF would have such an excellent advisor and assistant on financial questions in the broadest sense that an extra person is quite unnecessary.” He was overruled, however, and at first had to accept Hellingrath’s presence on the board. Because it had already been agreed with the German federal government to accept Wilhelm Boden – the then current president of the Central Bank of

⁵ “Aufzeichnung über den Verlauf des Gründungstages der Badischen Anilin- & Soda-Fabrik Aktiengesellschaft,” January 30, 1952; BASF UA, C 31/1.

⁶ Wurster, “Aktennotiz”, betr. Dr. Egon Frhr. von Ritter, January 26, 1952; BASF UA, C 21.

the State of Rhineland-Palatinate and a former prime minister of that state – three banks were now represented on the supervisory board.

Another controversial point was whether the chairman of the Federation of Associations for the Protection of Shareholders, Carl Christian Schmid, should be preferred over Leopold Freiherr von Schrenck-Notzing when it was announced that the number of seats on the supervisory board was to be reduced from the original 15 to 10. Speaking in favor of Schmid, who had been undersecretary in the Weimar Republic's Ministry for the Occupied Territories from 1926 to 1930, was the fact that the federation could be useful in the upcoming negotiations on the distribution of the trust's capital to the main successor companies and on other specific measures of divestiture, whereas von Schrenck-Notzing was primarily able to bring in the "capital of tradition" for building the confidence on which the new BASF especially depended. Schmid, the energetic former undersecretary, helped circumvent the dilemma by moving the French authorities, with whom he had good relations, to agree to increase the number of supervisory board members slightly to 11 or 12.⁷

As the second step in refounding BASF, the five owners of the new company chose six more supervisory board members to join Abs, Boden, von Hellingrath, Lazard, Schmid, and von Schrenck-Notzing. The additional members all brought in resources largely corresponding to the managing board's interests. There was Else Bosch, the widow of the late Nobel Prize winner who had headed BASF from 1919 until 1935 and had led it into IG Farbenindustrie AG in 1925. There was also Karl Göggel, who until his retirement was a member of the directorate (*Direktionsausschuß*), the postwar corporate decision-making body that had performed the functions of a BASF managing board until 1953. He was intended to serve as a link between the supervisory board and operational practice in the field of chemistry. The Nobel Prize winner Richard Kuhn, the director of the Max Planck Institute of Chemistry and Medical Research in Heidelberg, was invited because of his reputation and his knowledge of the research terrain. Richard Merton from the Metallgesellschaft and Hermann Schlosser, the general director of Degussa, one of the world's largest specialty chemicals groups, represented important clients of BASF. Acting on BASF's behalf after returning from emigration to the United States, Merton had also used his influence to set up important connections as president of the Deutsche Forschungsgemeinschaft (Germany's largest public research foundation) and as a member of the German group of the International Chamber of Commerce. Lastly, Mayor Valentin Bauer was named to the board to help ensure cooperation with the city of Ludwigshafen. After a long interval, BASF had once again created a network of trust and information capable of knowledgeably advising

⁷ Schmid to Wurster, "betr. Gründung der Basis-Gesellschaft," Düsseldorf, December 22, 1951; BASF UA, C 21.

the company on its course and looking after the interests of its owners vis-à-vis the managing board.

The composition of the BASF managing board, which the newly formed supervisory board selected in the third step of refounding the company, was essentially the same as that of the management responsible for operations since 1945. However, Carl Wurster utilized the refounding to make an adjustment facilitated by Göggel's switch to the supervisory board. It goes without saying that Wurster himself was confirmed as chairman of the managing board and was to remain in that position until mandatory retirement in 1965, when he would move to the supervisory board. The 42-year-old physicist Bernhard Timm, who had not previously served on the managing board but who had in reality long since risen from his role as Wurster's assistant to assume a key position of leadership, became deputy chairman. Walter Reppe, whose influence on the research profile in Ludwigshafen had been decisive since the 1930s, also moved onto the managing board. The lawyer Wolfgang Heintzeler and the engineer Walter Ludewig were just emerging as indispensable to the company in their respective fields. The imminent mandatory retirement of Fritz Krieger (sales), Fritz Helwert (personnel and social affairs), and Karl Pflaumer (dyestuffs) was due to lower the mean age of the managing board still further.

Disincorporation

BASF's entry in the Ludwigshafen trade registry on February 5, 1952, concluded the refounding of the company, but not the process of taking it out of IG Farbenindustrie. The latter maneuver was at least partially prepared now that there existed a new legal entity to which BASF's share of the Farben trust's assets could be transferred. The details of disincorporation had yet to be worked out: The amount of the share capital to be transferred to BASF and the other successor companies had to be fixed, subsidiaries and participations had to be assigned from the trust's assets, the remaining assets (i.e., those not integrated into the successor companies or included in the exchange of shares) had to be distributed, and the rules by which the shareholders of IG Farben could exchange their shares had to be set. The basis for these actions was created by General Order No. 1 pursuant to Law No. 35, published in the Official Gazette of the Allied High Commission (AHC) on May 17, 1952.⁸ The order provided for the creation of 12 successor companies and assigned them particular subsidiaries. Besides the "Big Three" – BASF, Bayer, and Hoechst – there were several small- and medium-sized enterprises. Of those, Cassella Dyeworks (Cassella Farbwerke AG, Mainkur), the Hüls Chemical Plant (Chemische Werke Hüls GmbH, Marl [CWH]),

⁸ *Amtsblatt der AHC für Deutschland*, 1952, pp. 1680–3.

and the Duisburg Copper-smelting Plant (Duisburg Kupferhütte AG) had a special status because the Big Three held joint interests in them for some time to come.

Clarification of the other unresolved issues dragged on. The reason stemmed not only from "perpetual Allied obstructionism," about which Wurster complained in December 1952;⁹ the German side, too, had conflicts of interests to fight out at the beginning. BASF's top management, for example, utterly opposed the proposal that Schmid of the supervisory board made to Ulrich Haberland, the managing board chairman of Farbenwerke Bayer AG.¹⁰ He wanted to see a capital share of DM 350 million assigned to BASF and to minimize the trust's remaining assets, whose distribution could serve to strengthen the successor companies financially at the expense of trust's shareholder assets. Both demands collided with the interests of BASF, whose managing board desired to minimize BASF's capital share (and hence the initial attendant costs of equity) and maximize the company claims to the trust's remaining assets. By August it had agreed with the successor plants and TRIFCOG that the lion's share (46.66 percent) of the trust's remaining assets, which were estimated to be worth DM 150 million, should belong to BASF. The company could therefore count on having DM 70 million.¹¹ This result, which was intended to cover the comparatively heavy losses due to the war, was felt to be extremely satisfactory "within the framework of what was achievable at all," and there was no desire to question it. The fact that Schmid had violated every article of protocol by even approaching Haberland only intensified the consternation in Ludwigshafen. Above all, they had no regard for a supervisory board member who "dashes off briefs whose consequences he does not grasp."¹² Wurster thereupon made it quite undiplomatically clear to Schmid that he wished there had been opportunity for this important matter to be discussed with him and Abs "in order to assess BASF's interests correctly in this context."¹³

But Schmid was by no means isolated in his thinking among the members of the BASF supervisory board. Leopold von Schrenck-Notzing also tried convincing Wurster that a high level of fixed assets need not only be a disadvantage.¹⁴ He asserted that the enormous tax burden alone advised against setting the Deutsche Mark capitalization of the major successor companies too low. Past practice, he observed, had already shown "that those ventures that had the courage to keep their capital in Deutsche Marks despite heavy war losses were able to grow into that capital and had even been able to

⁹ Wurster to von Schrenck-Notzing, December 5, 1952; BASF UA, C 21.

¹⁰ Schmid to Ulrich Haberland, November 15, 1952; BASF UA, C 31/1.

¹¹ Wurster to Abs, August 27, 1952; BASF UA, C 31/1.

¹² Wurster to Abs, November 18, 1952; BASF UA, C 31/1.

¹³ Wurster to Schmid, November 25, 1952; BASF UA, C 31/1.

¹⁴ Von Schrenck-Notzing to Wurster, November 26, 1952; BASF UA, C 21.

Table IV.1. *IG Farben's Main Successor Companies, 1952*

Company	Equity Capital (Millions of DM)	Fixed Assets (Millions of DM)	Share of the Trust's Fixed Assets (in %)
Bayer	387.70	380	19.40
BASF	340.10	317	16.20
Hoechst	285.70	203	10.40
Cassella	34.10	20	1.02

distribute a profit since the currency reform.” Indeed, every decision about the amount of capital assets to be taken over from the trust was a two-edged sword. A high level of fixed assets expanded the scope for write-offs and hence the possibilities for financing from the cash flow – if the write-offs were actually earned. On the other hand, the valuation of net assets also had an impact on the level of equity capital indirectly (i.e., after deduction of the reserves) and thus influenced the burden imposed by dividend obligations. The valuation of the trust’s fixed assets also indirectly affected the decision on the exchange ratio of shares. Whereas the shareholders were pressing for a ratio of 1:1, the plants at first came out for a ratio of 10:8, which was more in keeping with their interest in a relatively low valuation of invested capital. But rumors about plans for an under-par exchange made *IG Farben*’s share price plunge from 122 percent, its level when trading resumed on July 3, 1952, to 84 percent. A compromise finally permitted an exchange ratio of 10:9, and the stock exchange honored this decision with an opening price of 120 to 130 for the shares of the successor companies. Overall, the German side and TRIFCOG agreed to the distribution of the trust’s assets shown in Table IV.1.¹⁵

The share capital of the trust’s successor companies thus remained well below that of the former trust, which had been stated at DM 1.36 billion in the opening balance at the point of the currency reform. The net assets had risen again above the value of the share capital, although only somewhat less than half of the trust’s assets lay on the territory of the western zones and although they, too, had sustained air raid damage, especially in Ludwigshafen and Oppau. The German *IG Farben* Committee, in which the successor companies increasingly set the course, had cautiously opted for the “undercapitalization” of the new enterprises.¹⁶ In exchange for old trust shares with a par value of DM 1,000, shareholders received new securities worth DM 285 from Bayer, DM 250 from BASF, DM 210 from Hoechst, and DM 25 from Cassella in addition to liquidation share certificates worth DM 145. Nominally, they made a good deal. After all, the owners of money-based

¹⁵ *IG Farbenindustrie, Bericht*, p. 25. ¹⁶ Stokes, *Divide*, pp. 188–9.

resources lost no less than 93.5 percent of their assets in the currency reform of 1948. Measured against the prewar value of IG Farben and the eight-year interval without a dividend since 1945, however, they suffered losses as well. Under these conditions, BASF was under pressure to succeed from the outset. With its share capital of DM 340.1 million, the company had to produce a gross profit of around DM 100 million for the distribution of a 6 percent dividend, which was considered the minimum.¹⁷

The tug-of-war over the shares to be distributed to the subsidiaries of IG Farben continued into 1953. A typical example was the dispute over the deed for the Gewerkschaft Auguste Victoria, the coal mine in Marl-Hüls, which had been merged with IG Farbenindustrie AG in 1937.¹⁸ Because of the mine's proximity to the Hüls Chemical Plant (CWH) and the desire to improve the latter's viability, the Gewerkschaft Auguste Victoria was initially attached to CWH. However, BASF was able to convince the West German government that BASF's production of nitrogen depended on precisely the type of coke produced at Auguste Victoria. When the German Federal Ministry of Economics acted on this "imperative" by deciding in favor of BASF, it encountered British skepticism and objections from CWH, which saw absolutely no compelling reason for a cooperative venture with Ludwigshafen. Although the mine was capable of meeting 70 percent of BASF's specific need for coke, the company's legitimate interests certainly could have been accommodated in ways other than transferring ownership. But the 1951 coal crisis, which had led to widespread blackouts and in some industries to closures as well, was still a fresh memory, so fighting to safeguard BASF's source of supply appeared to Wurster to be worth the effort. He received the support of the French, who backed "their" BASF despite fundamental reservations about such processes of economic concentration. Resistance came at first primarily from CWH, which worried that it would eventually wind up under the control of its powerful neighbor. Yet CWH's own survival depended on licenses from BASF, so Wurster managed to forge a mutually satisfactory understanding without much difficulty. Once again – in connection with the negotiations on the Schuman Plan – fundamental reservations flared up among the Allies, who did not want to anticipate the arrangements of the European Coal and Steel Community. But when West German Federal Chancellor Conrad Adenauer firmly endorsed BASF's claim and feared that further delay of the decision would harm the Paris negotiations, TRIFCOG acquiesced and accepted the joining of Auguste Victoria and BASF.¹⁹

The assignment of the other subsidiaries proceeded less dramatically. The Ludwigshafen plant had old rights to the Duisburg Copper-smelting plant, for in 1876 the old BASF had been among the major German sulfuric acid producers that had created the smelting plant on one of BASF's properties.

¹⁷ Minutes of the managing board meeting of June 15, 1953; BASF RA.

¹⁸ On this point see especially the account in Stokes, *Oil*, pp. 77–80. ¹⁹ Ibid., pp. 79–80.

The purpose of this joint venture of the plants in the Rhine trading area was to purchase pyrite together in order to provide cheap pyrite for the roasters and a particularly advantageous source of raw material for the owners. Iron, copper, and many other metals such as gold and silver were extracted from the waste in the smelting plant's installations. By 1953 most of the war damage had been cleared and the modernization of the plant practically completed, so it was a very profitable enterprise when BASF took over 30.¹⁷³ percent of the capital – one-third of the share that IG Farben had held in the smelting plant.²⁰

The case was similar for the chemical plant in Oberhausen-Holten (Chemische Fabrik Holten GmbH), which the Ludwigshafen works of IG Farben had also helped found in 1930. Ethylene had been isolated there from crude gases and processed into ethylene oxide. BASF had then manufactured the "Holten products" on commission, including the best known trademark, the antifreeze Glysantin, which BASF developed itself. Solvents and softeners were also produced. Although nominally having put up only 30 percent of Holten's DM 2 million in corporate capital, BASF saw its stake in the company's assets and earnings swell to 46 percent when the shareholder loan was figured in.

BASF's initial participations also involved a 100 percent stake in the Breitenbach Consolidated Coal Mining Company (*Gewerkschaft des konsolidierten Steinkohlebergwerks Breitenbach*) and its untouched coal fields, a 50 percent stake in the Oberhausen Chemical Processing Company (*Chemische Verwertungsgesellschaft Oberhausen mbH*), a 33.33 percent stake in Oxo-GmbH Oberhausen, and a 100 percent stake in the Hamburg Indanthrenhaus. With the latter investment, BASF built on its former tradition in dyestuffs by taking over the brand responsibility for colorfast Indanthrone blue vat dye, invented by René Bohn in 1901.

On the whole, however, the extent of BASF's participation was quite limited compared to that of the two other major successors of IG Farben. In the separation balance sheet, which was calculated retroactively to January 1, 1952, Ludwigshafen constituted more than 98 percent of the company's installations, which totaled just under DM 317 million.²¹ No wonder both the new BASF and the outside world considered the company to consist chiefly of the facilities in Ludwigshafen and Oppau. This perspective was to influence BASF's future corporate strategy and subsequently left no doubt about the location of the expanding enterprise's economic core.

Rebirth

The moment finally arrived on the afternoon of March 28, 1953.²² A French military band marched before Building Lu I (later designated D 100) and

²⁰ BASF, *Bericht*, pp. 21–2. ²¹ Ibid., p. 16. ²² Heintzeler, *Faden*, p. 118.

accompanied the solemn lowering of the French flag with marching music. In the reception hall representatives of the French sequester authorities transferred authority over BASF to Carl Wurster and his seven colleagues on the managing board, ending the occupation period for BASF as well, albeit after a four-year delay. It ceased being an “extraterritorial Allied reserve.”²³ The ceremony had been preceded in the *Gesellschaftshaus* by an extraordinary plenary meeting of all five founders at which the articles of association were changed and the election of the workers’ representatives to the supervisory board was held, now that the Labor-Management Relations Act had determined that they should occupy one-third of the seats. One of the changes in the articles of association came at the insistence of the Allies and was aimed at preventing a reintegration of the trust’s successor companies until at least three years after expiration of AHC Law No. 35. This law stipulated that any member of the managing board or supervisory board who owned a controlling stake in any of the other 12 successor companies or who was a member of the managing board or supervisory board of such a company would be subject to removal. This restriction, like all others legislated by the Allies, remained in place until the Final Trust-Liquidation Act (*IG-Liquidationsschlußgesetz*) of January 21, 1955, rescinded it and finally concluded the breakup of the trust.²⁴

The ordinary meeting of the shareholders on September 23, 1953, also still had to take place with all five founders present in the administrative building of BASF. The rules stipulated that a shareholders’ meeting could not be held until 60 percent of a company’s shares had been exchanged. This process, which is tedious with registered shares, was not slated to begin until October 1 and was completed only in the course of 1954. Until then two trustees, Hermann Josef Abs and the Frankfurt auditor Fritz Brinkmann, represented shares totaling a face value of DM 340 million that had been added to the original capital of DM 100,000 as a capital increase as provided for in General Order No. 6 pursuant to AHC Law No. 35. After just 15 minutes of an adroitly run meeting, Abs was able to ascertain the result of the resolution and announce it without objections²⁵ – conditions that the chairman of the supervisory board must have nostalgically recalled by 1955. Carl Wurster recorded the outcome succinctly in his report to Dora Mittasch, who had succeeded her late husband as a “founder”: “It was resolved to carry forward the profit of 1952 into the next year rather than distribute it; the 12 members of the supervisory board appointed at the founding were

²³ “Die Neugründung der BASF im Zuge der IG-Entflechtung und die Entwicklung der BASF 1945–1954,” report by Carl Wurster, July 15, 1954; BASF UA, C 21.

²⁴ *Amtsblatt der AHK für Deutschland*, 1955, pp. 3161–7.

²⁵ Minutes of the ordinary shareholders’ meeting of the Badische Anilin- & Soda-Fabrik Aktiengesellschaft in Ludwigshafen on the Rhine for the fiscal year of 1952, BASF UA, C 21.

re-elected. The acts of the supervisory board and the managing board for the fiscal year were formally ratified.”²⁶

They did not have to endure the criticism of the shareholders, certainly some of whom would have disagreed with the decision to forego a dividend distribution for 1952 even in the well-understood interest of the shareholders. The managing board’s decision to favor a strategy still marked by the inescapable need for reconstruction was difficult to defend given the company’s headlong growth in turnover, declining costs, and improved results, particularly since Bayer and Hoechst, the two other major companies that succeeded the trust, each paid a dividend of 4 percent. In any case, the original intention of presenting the result in such a way “that the closure of 1952 again shows a small commercial loss”²⁷ was no longer tenable in view of week-to-week improvement in the year-end figures. The year closed with a recorded profit of DM 836,738, which was carried over to 1953.

In late March 1953 the new company also presented its first balance sheet, which reflected the resolutions of disincorporation retroactive to January 1, 1952. The fixed capital of DM 317 million constituted by the plant facilities was based essentially on the values listed in IG Farben’s opening DM balance sheet, which took account of the depreciation calculated since the currency reform. Real estate from the period before the currency reform was listed in the balance sheet according to its updated assessed value. Because BASF had good reason for not wanting to follow IG Farben’s cautious stated amount, it raised the assessed value of the entire installation by approximately DM 48.7 million in order to take some account of the company’s future depreciation requirements.²⁸ Intangible assets in the form of concessions, patents, licenses, and similar rights were listed at a value of DM 12.4 million only because the opening balance of January 1, 1952, was relevant for taxes as well. In 1955 the managing board acted on its intention to depreciate this item down to DM 1.²⁹

The participations taken over from the assets of IG Farben were all assumed at the book value declared by the trust and together brought in DM 86.4 million. The Gewerkschaft Auguste Victoria, listed at DM 76.9 million, accounted for the largest part and represented one-eighth of BASF’s turnover in 1953 alone. Current assets consisting of raw materials, intermediates, and finished products, which amounted to DM 221.9 million, were consistent with the necessities of the company’s widely branching production processes and with a smooth sales operation. Accounts receivable, which totaled DM 90.9 million, were of an extremely short-term nature, with those related to deliveries amounting to scarcely more than a month’s turnover. The portfolio of securities (DM 14 million) and the relatively low level of other liquid

²⁶ Wurster to Dora Mittasch, September 24, 1953; BASF UA, C 21.

²⁷ Minutes of the managing board meeting of June 15, 1953; BASF RA.

²⁸ BASF, *Bericht*, p. 16. ²⁹ BASF annual report for 1955, p. 30.

assets (DM 10.5 million) were about what could be expected given the circumstances arising from reconstruction, which had not yet been completed. Opposite these figures, on the passive side of the balance sheet, were reserves totaling DM 172.4 million, along with the share capital of DM 340.1 million. An item of DM 1 in current assets remained on the balance sheet as a reminder of the consent to count up to DM 67.3 million as an open claim on the trust's remaining assets so as to enlarge the reserves accordingly. The sum of DM 165 million that was owed according to the burden-sharing law compensating for different levels of war losses did not have to be listed as a liability. The vast majority of the company's liabilities totaling DM 207.3 million were of a long-term nature. This sum included most of the DM 33.3 million earmarked for prospective retirement benefits. The liabilities also consisted of long-term obligatory outlays for corporate social services, such as DM 48 million for the retirement funds, the largest single item.

All in all, the opening balance sheet, the cornerstones of which were set by Wurster and Abs working closely together, revealed a rather defensive stance. Although the balance sheet served as a financial report for both business and tax purposes, a relatively wide scope for valuation opened up, and the executive and supervisory boards used it with extreme caution. The result offers little insight into the new BASF's true substance, which exceeded the balance sheet sum of DM 753 million only in terms of potential. The outlines of the new domestic and world economic conditions were already emerging in 1953, but basic confidence in lasting prosperity and expansion was still absent. After all, it had been only seven years since the end of the war and only one generation since the onset of the Great Depression. The opening balance, however, clearly indicated that the new company had managed to withdraw virtually debt-free from the trust, aside from its share of the DM 10.2 million loan secured in 1939.

The outlook for BASF's viability was shown less by the figures submitted when the company was refounded than by the dynamics of growth, which set in even as disincorporation was in progress and which drove up the value of the new share certificate. Although IG Farben shares had fallen below par in late 1952, the price of BASF shares rose continuously until November 1954, reaching 200 percent. Investments of DM 104.6 million clearly showed that 1952, the first year of business for the new BASF, came during a boom that commenced in the West German economy after the crisis in Korea.³⁰ The pace of growth continued in 1953, augmenting BASF's turnover by more than one-third – without its associated companies and subsidiaries. This result was due not least to a strategy of selective investment in programs that made a monetary return as soon as possible. To reinforce this effect, the Technical Committee promoted investments that did not entail additional

³⁰ "Die Neugründung der BASF im Zuge der IG-Entflechtung und die Entwicklung der BASF 1945–1954," report by Carl Wurster, July 15, 1954; BASF UA, C 21.

labor.³¹ The objective was clear: At the first shareholders' meeting after the exchange of shares had been completed, every effort was to be made to bring fiscal year 1953 to a close that permitted distribution of a dividend. In order to achieve a 6 percent dividend, a gross profit of DM 100 million was necessary if the uncommitted reserves were to remain untouched. Without having to draw down the reserves, the BASF managing board ultimately proposed a 7 percent dividend (though not without casting a sidelong glance at the dividend policy of the two other major successor companies of IG Farben). The shareholders gladly agreed at their meeting, which was held on June 15, 1954, in the Pfalzbau, the largest hall in the city of Ludwigshafen.

The positive light in which BASF's rebirth appeared was due mainly to two things. First, the company was rich in traditional values, which were at least as valuable as the capital that it could take over from IG Farben. They were now consciously mobilized for a new agenda. Second, BASF promised to be able to deliver precisely the products and services in demand by the expanding world market and a rampantly growing domestic economy undergoing reconstruction. The former characteristic owed to BASF's ability to reconnect with the old BASF without questioning the continuity with the IG Farben era. The appointment of Carl Bosch's widow to the supervisory board symbolized these ties as much as did the inclusion of the old cofounding family, the Schrenck-Notzings, and the icon of BASF research, Alwin Mittasch, as cofounders of the DM 100,000 company. The BASF research center of the German chemical industry had steadily supplied new innovations of world importance before and during the IG Farben era, and the call to rally around that traditional image was enhanced still further when Nobel Prize winner Richard Kuhn was appointed chairman of the supervisory board. On the managing board the deliberate return to old values was personified by Walter Reppe, whose reputation as the brilliant mind behind Reppe chemistry remained undimmed even in the shadow of the emerging petrochemical industry. The new company's focus on the plant installations in Ludwigshafen and Oppau also helped reanimate a specifically BASF corporate culture, if the integration into the Farben trust had infringed on it at all. Traditions of IG Farben were not shunned, either. For all the political contamination by the crimes committed by the Nazi regime, the entrepreneurial respect in which the Farben trust was held survived war and divestiture practically intact at home and abroad.³² With two former representatives of IG Farben

³¹ Minutes of the managing board meeting of June 15, 1953; BASF RA.

³² Without exception, the emissaries of IG Farben's successor companies who traveled to the United States after 1945 enjoyed a status equal to that of their American colleagues. Bernhard Timm was thus able to revive old relations with IG Farben and visibly welcomed the respect shown him although he was not yet a member of the managing board. Hermann Josef Abs, who was visiting the United States at the same time, was given every honor as he delivered one address after another to members of the American business community. See Bernhard Timm's diary of his first trip to the United States from November 23, 1919, to January 20,

in key positions – Carl Wurster as chairman of the managing board and Hermann Josef Abs as chairman of the supervisory board – it seemed possible to participate in this aura of success and still hold thoughts of concentration at bay. Neither representative of BASF's top leadership had political scruples about his association with the entrepreneurial legacy of IG Farben. All charges against them as defendants in Nuremberg had been dismissed. In 1954 Wurster spoke for all former IG Farben managers of BASF when he publicly supported the convicted directors of the trust: "At no time did we ourselves ever see any of these men as a criminal."³³ The viability of BASF rested in part on the attractiveness of the company's traditional range of production, which centered on the manufacture of basic inorganic chemicals, organic intermediates, dyes, nitrogenous products (including those for fertilizer), and plastics. But a factor at least equally important in ensuring the future of BASF is likely to have been the public's assessment that BASF, with its demonstrated technological competence and its pioneering petrochemical research in Ludwigshafen, was the first major chemical company in Germany to catch up with technological development in the petrochemical industry. Most of all, however, BASF owed its renown among customers to the sterling reputation of its applied research, which seemed to guarantee continued success on volatile, innovation-driven product markets.

2. CORPORATE CULTURE: TRADITION AS A RESOURCE?

Rules and Context: The Social System of Production

The avowal of continuity and tradition that marked the refounding BASF was no public relations ploy to engender trust in the midst of uncertainty. It was instead the natural expression of a stable corporate culture bearing amazingly few traces of the economic, political, and organizational vicissitudes of the previous quarter century. Serious events and processes such as integration into the Farben trust; the shock of the Great Depression; the transition to the policy of autarky; and the challenge of armament and the war economy, not to mention ultimate destruction, collapse, and occupation had changed little in the norms of entrepreneurial behavior and thinking in Ludwigshafen. The social system of production had survived largely intact.

Not that there had been a lack of attractive alternatives. The philosophy, institutions, and organizational forms of American business had enjoyed high regard since the 1920s, particularly in the chemical industry. Until late into the Third Reich, the business elite in that sector had been fascinated by

1950, private archive of Dr. Bernhard D. Timm (hereafter: PAT). I am greatly indebted to Dr. Timm for these and other loaned materials and for much valuable information.

³³ "Die Neugründung der BASF im Zuge der IG-Entflechtung und die Entwicklung der BASF 1945–1954," report by Carl Wurster, July 15, 1954; BASF UA, C 21, p. 4.

the U.S. economy, which represented the state of development aspired to in Germany but thwarted by the devastated world economy. Despite the positive response to those American management ideas and practices, they only rarely led to institutional or organizational change in German companies because the costs of such changes were expected to outweigh the benefits. Conditions in Germany and the United States differed considerably, with the gap between the two production regimes having spread rather than narrowed since World War I.³⁴ To exploit their advantages in the supply of raw materials and their free access to key sales markets, American chemical producers focused on the mass production of a small range of products and the ever heavier emphasis on producing for end consumer markets. The German chemical industry did not have the same access to raw materials and vast markets. Instead, it sought its comparative cost advantage by refining processes that supported operations using broadly integrated production programs (*Verbund*) and by concentrating on products involving a wide variety of applications that were customized for the most part. The industry pursued a quality-based competition strategy, the idea being to offer higher quality than competitors did.

A precondition for the success of this strategy, which BASF had perfected, was the institutional framework enabling corporate policy to emphasize a long-term orientation to quality. Competitiveness on important product markets was enhanced by the use of comparative institutional advantages. These prerequisites included stable and sound corporate governance that would enable top management to provide leadership fully responsive to the interests of owners and employees. The market strategy of diversified high-quality production³⁵ had to be underpinned by long-term stability in the company's financial foundations in order to open the scope for corporate policy as much as possible. An almost equally important precondition was a training system that took the industry's technological state of the art as the standard of skill development and kept the expertise of the core workforce well honed. Given the crucial importance that academics have as researchers and managers for a company of "new industry," investment in human resources had to go far beyond the dual system of occupational training. It had to engage universities and research institutes and could not ignore the company's own advanced training and development function.

Another feature of this German production regime – and in many respects its cohesive element – was the broad cooperation between businesses within their sector, whether through associations, cartels, or other more or less close forms of interaction. In this regard the trust structure of the dyestuff industry had been an extreme instance. Not only had it suspended the legal independence of its member organizations, but in practice one of its pivotal

³⁴ See Abelshauser, *Umbruch*, and Soskice, *Globalisierung*.

³⁵ For information about the basis of this concept, see Streeck, *Conditions*.

functions had been to promote cooperation as well. Intervention by the occupation powers, such as their attempts to break up the big banks, strip power from the major associations of enterprises, eliminate the business sector's influence on the dual system of occupational training, and ban cartels, had jeopardized many aspects of this production regime. In the end, however, the Allies did not manage to destroy it, only to rid it – albeit unintentionally – of its worst rigidities. The main ones were the monopolistic structures of competition, which were altered through decartelization and divestiture, and the way associations operated, which had visibly suffered from bureaucratization and overorganization even before 1933. These reforms had thus made the German economy's institutional framework and organizational form more efficient and attractive, though both remained essentially unchanged. The same was true for such aspects of the system as industrial relations on the shop floor and on the labor markets, where institutionalization and formalization had increased after 1945. In response to the problems that had arisen partly from the growing importance of knowledge-based production and the asymmetrical distribution of knowledge in the plants, the development of codetermination – of workers' participation in controlling shop-floor conditions and management decision making – continued the trend toward the search for an answer consistent specifically with German conditions. The chemical industry was a prime example in this respect.

It was certainly not the sheer staying power of institutions that prevented the German chemical industry from overhauling its system of social production. The hindrance was the persistence of the incentive structures that had been setting the direction of institutional change as well. There was little change in either the chemical industry's position on the product markets or the need to draw on the accumulated capital of its corporate structure in order to solve new problems. BASF had to exploit its distinctive strengths to the fullest if it wanted to prevail against Bayer and Hoechst, and especially against foreign competition, on the market at home and abroad. These strengths had always been – and still were – the quality of research, customer-centered applied technology as a convincing marketing concept, and sophisticated process technology that guaranteed low production costs when combined with the synergies generated by harnessing the resources of different lines of production and technical infrastructures (*Verbundsystem*, or the verbund system, as BASF refers to it in English). Further development of these fundamentals in the company's capacity to innovate and compete demanded far-sighted business strategies and decisions. Therein lay the merits of the existing production regime, so its retention was never questioned on the German side, in Ludwigshafen or anywhere else.

Strategy and Structure: Corporate Leadership

As practiced at BASF in the early 1950s, corporate management drew on elements of consensual leadership as a basis for stability and continuity and

linked them with what came across as enlightened absolutism in decision making at the highest operational levels of the company, making for rapid and responsible management. The old German Stock Corporation Act of 1937 strengthened the position of the chairman of the managing board by confining the responsibility of the other members to their respective areas and thereby investing the chairman with undisputed day-to-day entrepreneurial prerogative. Six of the managing board's eight members each represented a particular function for which that person carried full responsibility: legal affairs, finance, research, sales, personnel, and technology and engineering. The chairman and the deputy chairman made the strategic as opposed to the operational business decisions, with the chairman having the final say. If decisions arrived at in the functional areas affected the company as a whole, the chairman put them on the agenda of the next managing board meeting.

Regular board meetings took place on the first and third Mondays (later, Tuesdays) of the month, beginning at 9 a.m. The individual members were expected "to report on or bring up for discussion such matters presumably necessary or desirable for each managing board member to be informed about."³⁶ The opinion of the board would emerge from the contributions that the individual board members made to the discussion, but formal votes were never taken. It was the chairman's task to formulate the board's consent as a proposal made by a functional area or to defer a decision. When enough support had been marshaled for the proposal, it was reconsidered and approved by the chairman, usually without further discussion.

Not until 1962 did the managing board decide to formalize the preparation and running of the meetings, which up to then could occur quite spontaneously.³⁷ The topics had to be sent to Wurster by Thursday evening so that a prioritized agenda for the next board meeting could be distributed on Friday. In principle, suggested agenda items accompanied by a brief written explanation were examined first. At the first meeting of each month, attention was devoted chiefly to the previous month's figures with a focus on "profit maximization and corporate growth" as compiled and reported by the representative from finance. Other standard items on the agenda of the managing board were the accident reports by the board member responsible for technology and engineering, and the presentation of important complaints as given by the board member responsible for sales. Besides routine meetings, special meetings were convened for important issues. They took place on available Mondays and addressed, in regular sequence, the problems pertaining to the individual functional areas, to BASF's foreign and domestic subsidiaries and companies in which BASF had a stake, and to succession planning.

In addition, the chairman of the managing board or his deputy presided over meetings at which the heads of the individual plants and departments

³⁶ Minutes of the inaugural managing board meeting of June 1, 1953; BASF RA.

³⁷ Minutes of the managing board meeting of May 7, 1962; BASF RA.

were represented. They were known collectively as the directorate meeting (*Direktionssitzung*), in reference to the directorate (*Direktionsausschuß*) of the years 1945 to 1953. Although it had no formal role in the corporate structure, it did facilitate communication and, in “the general view” of the managing board, was “to continue having an important part in the company’s overall management.”³⁸ However, the activity of the directorate, which had been the sole organ managing the company in the interim before the creation of the Ludwigshafen managing board, and the work of the company’s numerous committees and subcommittees had to keep within the framework of the managing board’s resolutions and directives. This stance remained unchanged even after the directorate meeting had swollen to more than 50 members and could no longer serve a decision-making role.

The leadership constellation that provided for continuity at the top of BASF for more than 20 years was already in place when the “founding board of management” was created. Dr.-Ing. Carl Wurster had embodied the continuity from plant manager of the “Upper Rhine operating group” of IG Farbenindustrie AG to the director of the Badische Anilin- & Soda-Fabrik (IG Farbenindustrie AG in Liquidation) when he was appointed chairman of the managing board of the new DM 100,000 company on January 30, 1952. Three qualities recommended him for the leadership of a major chemical company: his reputation as a successful chemist, acquired during many years as the chairman of the Inorganics Commission; the charisma of a man who had guided the Ludwigshafen plant with a sure hand through hard times; and the uncompromised authority that carried over from his days as a ranking company official (*Führer des Betriebes*) under the Nazis into the occupation period.

Wurster, who was born in 1900 in Stuttgart, had started early to acquire the skills that differentiate entrepreneurial leaders from other managers, for in January 1938 he was appointed as one of the youngest members of IG Farben’s managing board and was named *Betriebsführer* of the Ludwigshafen-Oppau complex. He had come to know the markets on which BASF had to operate, grasped the technological implications of his decisions, and was part of a network of people and connections that supplied him with information. He had a theoretical and practical background that enabled him to make decisions under time pressure even in the absence of accepted guidelines.³⁹ His discriminating entrepreneurial judgment freed him from routinized thinking in indices and from other managerial decision-making aids, although he had ever-increasing numbers of them calculated by the central office (*Zentralbüro*) and the departments. He knew that assessing the profitability of an investment in a basic chemical product, such as phthalic acid in the manufacture of dyestuffs, could make “reliable supply more important

³⁸ Minutes of the inaugural managing board meeting of June 1, 1953; BASF RA.

³⁹ On the definition of entrepreneurial function, see Casson, *Unternehmer*.

than the pay-out time." This logic would have been an argument against expanding an existing joint venture with the Gelsenkirchen Mining Company (Gelsenkirchener Bergwerks AG, GBAG) to build a phthalic acid plant in Bochum.⁴⁰

Because of his unchallenged authority as chairman of the managing board, Wurster saw no problem in sharing his entrepreneurial management functions with his deputy chairman, who was nine years his junior. Within the managing board, Bernhard Timm was seen as the "crown prince" from the outset, and he never left any doubt about his own ambitions. He, too, had earned his spurs in the Upper Rhine operating group of IG Farben, having joined the Oppau ammonia laboratory in 1936. He had come at the recommendation of Carl Bosch, in whose private Heidelberg observatory the young astrophysicist had served as an assistant for two years. This recommendation may have initially helped his career, especially since contact with the Bosch family continued even after Bosch's death. Timm soon made a name for himself in his field of spectroscopy, and before the end of World War II he became the director of a physiochemical working group in Oppau. His career did not really take off, though, until the occupation period, when his moment came during constant negotiations first with American, then with French control officers. Timm was well prepared for this situation, having written his diary in English since December 1944, in French as of June 1946, and again in English as of early 1948. However, it was not mainly his linguistic abilities that made him indispensable to Wurster even before the latter's indictment in Nuremberg. Timm proved himself a skilled negotiator with the occupation officers and demonstrated entrepreneurial talent that Wurster drew on with ever greater frequency.

It was particularly in Wurster's absence during the Nuremberg trials that Timm, his personal assistant, rapidly grew into the role as the director of the factory, although he had not yet been given formal power of attorney to represent the company (*Prokura*). His burning ambition therefore soon put him at loggerheads with the three leading directors, Karl Göggel, Fritz Helwert, and Karl Pflaumer, who, as he saw it, deliberately denied him the career advancement he deserved and even blocked his attempt to revive the old relations with Standard Oil.⁴¹ At any rate, he was determined to focus on his own career rather than let himself be worn down for the sake of other people. As he explained in his diary over Christmas 1944, the way to accomplish that aim lay in exercising more "self-control" of his own character and behavior – something he saw as his "main problem" regardless of accumulating day-to-day concerns.⁴² He pledged to intensify his egoism and selfishness and planned to elbow rivals harder. He recorded the progress

⁴⁰ Minutes of the managing board meeting of March 27, 1957; BASF RA.

⁴¹ Timm, Diary, Sunday, January 25, 1948, pp. 103-4; PAT.

⁴² Ibid., Boxing Day, December 16, 1944, p. 5.

of this strategy in his diary under the regular heading of "self-control." Standing before the ruins of his physics laboratory, he also realized that the position as Wurster's assistant was, for him, now "of more importance than the work in the Ammoniaklaboratorium [would be] because that will keep me in close contact with the management and this gives me a certain advantage."⁴³

Subjects on which he could test his self-therapy turned up often enough: the control officers of the occupation powers, to whom he conveyed a feeling of loyal cooperation but whom he tried to "control" in his own interest. The more he tied his future to the success of BASF, the more closely his personal benefit meshed with the firm's and the better able he was to cope with the diverging interests, so he became indispensable to both sides. In the directorate, Timm collided on technical matters so often with Karl Göggel, the head of the high-pressure department, that the former finally decided in early 1948 to "choose to pick up all kind [sic] of economic and commercial questions as the center for my activities, avoiding there a direct collision with Dr. Göggel in the technical field and [preserving] enough free movement to fix up my technical knowledge for future work."⁴⁴ In the end, he also managed to win over many of the foreigners who visited Ludwigshafen in the immediate postwar period. He thereby pieced together an ever tighter network of advantageous relations. Still without formal status, he wound up sitting in Carl Bosch's old office in Lu I as of March 1948 and set out "to make some progress now in the direction of the general management of the plant."⁴⁵ This new function was retroactively legitimated on April 1, 1948, when Timm was at last given *Prokura*.

Timm's later career did not just fall into his lap, though. Working daily on grand visions for the future, he saw himself surrounded on the directorate by "mediocrity." Given the uncertainty of Wurster's return, it wore on his nerves so much that he often thought "it might be the moment to usurp the central power in the management."⁴⁶ His hope that the situation would quickly change in his favor after Wurster's release from the Nuremberg remand prison went unmet at first. Wurster did promise that Timm would eventually become his deputy but held off taking other steps to promote him. Wurster at least dissolved the directorate, depriving Timm's older rivals of power. The work of the management bodies was thereafter shared, with Wurster concentrating on the Technical Committee and Timm on the Commercial Commission.⁴⁷

The unclarified question of status left Timm feeling a mounting degree of "considerable nervous strain and sometimes even a certain uneasiness" toward his mentor.⁴⁸ Although Timm had functioned as the *de facto* deputy for a year in the company's management and had negotiated at Wurster's

⁴³ Ibid., pp. 4–5. ⁴⁴ Ibid., Monday, February 16, 1948, p. 107.

⁴⁵ Ibid., Tuesday, March 4, 1948, p. 122. ⁴⁶ Ibid., Sunday, May 15, 1948, p. 122.

⁴⁷ Ibid., Sunday, October 2, 1948, pp. 145–6. ⁴⁸ Ibid., Saturday, October 30, 1948, p. 148.

side with the banks on funding for an enlarged nitrogen group intended to subsume the departments of low pressure, high pressure, and acids, Wurster could still not bring himself to violate seniority rule by making Timm the head of the new nitrogen group and officially making him his deputy. Not until Timm formulated his claims in writing and threatened that he was “no longer willing to participate in the administration of our plant unless I shall have a clear definition of my duties and my power”⁴⁹ did Wurster officially clarify the lines of authority, albeit without formally passing over Karl Göggel. Only the founding of the DM 100,000 company created a way to resolve the strained management relations to Wurster’s satisfaction.

BASF profited from the successful symbiosis of its top two men until 1965 precisely because their characters and temperaments differed so much. In a sense, the company also continued benefiting until 1974 by virtue of Wurster’s move into the chairmanship of the supervisory board. Wurster’s keen entrepreneurial judgment was accompanied above all by the ability to integrate and motivate people, to cultivate and use community spirit, and to elicit trust both within the organization and between it and the outside world with almost cheerful imperturbability. Personal ambition was alien to him. His uncontested authority rested on respect and affection. In many ways Timm was his opposite. Ambitious, dynamic, and assertive, he worked consciously toward the moment at which he alone would assume responsibility for the company. For him, and hence for BASF, the place at the top was the only one that existed. He was a workaholic with no private hobbies, and he demanded utmost effort and allegiance from employees and colleagues. He did not win their affection, but they respected his strategic creativity, to which BASF repeatedly owed its auspicious positions in the competition for future markets.⁵⁰

The long 1950s, those one and a half decades that were closely linked in their basic economic and social development from the early 1950s to the mid-1960s, followed their own laws in German economic history.⁵¹ The era of Europe’s “economic miracles” and the boom in the global economy, in which Wurster and Timm aimed to have BASF catch up with the development on world markets and return to the top ranks of the chemical industry, did not require great business savvy. The entrepreneur’s key function of being able to make decisions in an uncertain environment so as to husband scarce resources was rarely tested under the unusual conditions of growth during reconstruction: consistent paths of development and the task of narrowing the technological lead that other countries had. Where the standards seemed to be prescribed and the objectives set, it was first a matter of figuring out the best economic tack to achieve them and then of vigorously pursuing it.

⁴⁹ Ibid., Wednesday, August 10, 1949, pp. 163–4.

⁵⁰ Interview with Dr. Rolf Magener, December 3, 1999, Heidelberg; BASF UA, W 1 (minutes of the interview).

⁵¹ On the concept of the long 1950s, see Abelshauser, *Jahre*.

This approach did not change until the 1960s, when the nearly calculable wave of demand gave way to increasing volatility and diversification, which quickly spread to the supply side as well. The change called not only for a new quality of entrepreneurial judgment but also for the adaptation of the decision-making structures that had survived, re-emerged, and seemingly proved so successful. Not surprisingly, decisions on both major and minor investment projects were made decentrally without a regular procedure in the 1950s (though the managing board did reserve the right to give final formal consent in each case). In order to receive the desired internal investment "loan," or "credit," the requesting departments usually only had to mention the limits to the capacity of the unit involved. It seemed perfectly reasonable to expect a continuation of the two-digit growth rates often experienced in the past. The investment subcommittee of the Technical Committee afforded minimal coordination but usually approved the proposals without hesitation.

The entire loan amount approved by the Technical Committee thus practically always far exceeded the volume of investment that could be used given the available and quickly achievable technological resources. By 1954, the relation between what was technologically desired and what was technologically feasible was already two to one. In other words, the accounts showed a recommended total loan amount of DM 250 million listed opposite DM 120 to 130 million of what could be technologically accomplished at all by the end of the year.⁵² Up to that point, approximately DM 36 million had been released for investments, and the company's workforce had been expanded accordingly by about 1,000 persons. To use the DM 90 million or so that still seemed possible, it was necessary in the second half of the year to bring in an additional 2,000 workers (1,000 mechanics and electricians and 1,000 construction workers) from external companies.

The programs were therefore not governed by economic priorities derived from a comparison between the returns to be achieved but rather primarily by their technological aspects. Questions about investment decisions reached the managing board only if they involved participations in external companies and hence affected BASF's relations with the outside world or if such questions concerned the relatively rare cases of totally new investments whose chances on the market were unknown. Otherwise, the managing board treated the documents from the Technical Committee's investment subcommittee (renamed the division directors investment meeting in 1962) as solid facts for which the financial wherewithal had to be provided. Until the late 1960s, the bottleneck in this investment policy was practically never the funding but rather the availability of human and technical resources. Timm and Wurster thus regularly stated in the committees "that the financial side is unlikely to be an obstacle, so everything must be done from the technological side to maximize performance."⁵³

⁵² Minutes of the managing board meeting of June 21, 1954; BASF RA.

⁵³ Spartenleitersitzung/Investitionen, May 21, 1964; BASF UA, C 13, Ordner 138.

In this context, BASF in the long 1950s resembled a tanker whose course neither could be nor needed to be controlled very much. The vast majority of decisions defining what the company offered followed the routine of calculable markets and were made decentrally without the development of entrepreneurial incentives for independent action. The departments, divisions, and committees, dominated as they were by chemists and engineers, lacked nearly everything needed for such independence, from concepts of costing and an awareness of returns to the fundamental mindset for ensuring the efficient use of the investments.⁵⁴ So, too, did the basis of the managing board's blanket resolutions fluctuate. They regularly required "that the profitability of each program endorsed by the Technical Committee be scrutinized and approved by the central office, the office of the Technical Committee, and the departments involved."⁵⁵

Since the summer of 1962, BASF did have preliminary guidelines for handling investments. They stipulated that the newly created investment meeting of the division directors had to have held three "readings" of the submitted investment applications for programs of more than DM 100,000 by the time the decision was made.⁵⁶ This body decided on whether to give clearance for planning, clearance for development, and recommendation for approval by the managing board. The procedure permitted input not only from the sales department but also from the applications department (known as Aweta, from *Anwendungstechnische Abteilung*), which pursued a number of research and customer-support services as well as know-how transfer, all aimed at making diversified high-quality products out of bulk goods. The final phase of the procedure even called for figures on an investment's anticipated returns. As long as the underlying economic conditions remained unchanged, so did the practice of decentralized decision making without decentralization of entrepreneurial responsibility. The managing board therefore saw the resulting investment structure less as an outcome of its own strategic decisions than as an indicator of developments on the markets in which BASF operated. It was not an outcome but rather a basis for entrepreneurial action.

The managing board was not the arena for wrestling with weighty strategic decisions. It was not that the board members lacked the proper technical expertise. Quite the contrary, almost all of them were highly experienced chemical researchers or engineers. The few strategic decisions needed by the early 1960s had been made by top management and had not been presented to the board for consent until the final stage. This approach left the board

⁵⁴ Minutes of an interview on December 3, 1999, with the former managing board member in charge of finance (1962–1974), Rolf Magener, who found this state of affairs in pure form in 1957 when he joined BASF's banking department; BASF UA, W1.

⁵⁵ Minutes of the managing board meeting of June 21, 1954; BASF RA.

⁵⁶ "Behandlung der Investierungen – Vorläufige Richtlinien – Ludwigshafen/Rhein," July 18, 1962; BASF UA, C 13, Ordner 138.

little leverage of its own, if any. But it was not confined to its minimalist legal function as top management's "notary." The managing board was primarily an instrument for keeping its members equally informed and as an advisory body for top management, to the extent that these purposes had not already been performed by the departments directly affected as the decision took shape. Until the 1966 amendment of the German Stock Corporation Act of 1937, the members of the managing board bore responsibility solely for the affairs within their respective departments. Only the chairman and the deputy chairman had jurisdictions affecting the entire enterprise. This arrangement buttressed their position within the managing board to a degree that enabled them to make decisions on their own if the responsible board member agreed. At worst, this legal framework opened the door to the exercise of power based on the principle of "divide and conquer." At best, it guaranteed the "enlightened absolutism" of an exceptional entrepreneurial figure.

During this phase of West German corporate governance, BASF had the good fortune of having at its helm a man who used his power in an enlightened fashion. Carl Wurster had the ability and authority to mobilize collective expertise on the managing board, to rein in the egotism of the departments, and to instill the board members with a sense of responsibility for the company as a whole. However, these circumstances do not mean that the managing board practiced any voting in which majorities could muster support for or against a motion. As late as 1966, the board was still operating completely without standing rules of order. In theory, this situation changed radically when the amended German Stock Corporation Act took effect. In practice, however, things proceeded in Ludwigshafen as they always had. The new law did reinforce the rights of the individual members of the managing board by authorizing only the collective management by all the board members if the board had no standing rules of order. But the leadership style on the managing board after Carl Wurster's retirement to the supervisory board shifted perceptibly toward a top-down, tighter decision-making process that did not please all the department heads.⁵⁷

Retention of the old power relations at the top, which would permit Timm to put his own stamp on the managing board, necessitated adoption of standing rules of order designed "to preclude . . . the principle of having all managing board members assume complete responsibility for all business transactions."⁵⁸ "In light of Section 77 of the new Stock Corporation Act, the managing board unanimously states the following: a) The current distribution of departments among the members of the managing board is regarded as standing rules of order as defined in Section 77 of the new Stock

⁵⁷ Minutes of an interview with Dr. Rolf Magener, December 3, 1999; BASF UA.

⁵⁸ Attachment 5 to the minutes of managing board meeting 21/66, re: Managing board rules of procedure, June 22, 1966; BASF RA.

Corporation Act; and b) In keeping with past practice, each member of the managing board is obliged under the standing rules of order to keep the other managing board members abreast of development in his area of work and to seek the decision of the entire managing board for business transactions of fundamental or special significance.”

Consenting unanimously to this arrangement, the board members declared “that the BASF managing board has managed quite well since 1953 without written standing rules of order, and... we cannot do without a degree of elasticity in the standing rules of order, particularly during the transition to a group corporate structure. In practice, the entrepreneurial dominance of the managing board chairman was thereby perpetuated beyond the change in the legal framework. Although the change in the top management from Bernhard Timm to Matthias Seefelder in 1974 ushered in another break in leadership style, which Seefelder himself described as a “transition from Northern German brick Gothic to the Baroque,” the strict hierarchy of the managing board remained in place.⁵⁹ The position of the managing board chairman was still so strong in the 1970s that he could name his own successor despite the supervisory board’s formal jurisdiction.⁶⁰

The continuity among the members of BASF’s managing board in the 1950s and 1960s remained about as great as that of the top management. Walter Reppe, the last representative of the old trust generation, retired in 1957 and was replaced by Adolf Steinhofer. The only other change of consequence for the board’s work occurred in 1962, when Rolf Magener took over as head of corporate finance, replacing Julius Overhoff, who had already retired in May 1960. Rotating into the supervisory board, the managing board members who resigned for reasons of age ensured continuity in that body as well.

Magener soon became one of the heavyweights on the managing board, joining Wolfgang Heintzeler (legal affairs) and Walter Ludewig (technology and engineering), who had been on the board since its creation and whose very personalities gave them influence on corporate policy beyond their respective departments. Magener had completed a sales apprenticeship in Ludwigshafen during the era of the trust, and during the war he had held a middle management position for business with India. He managed to break out of a British detention camp in India and return to Germany after an adventurous escape to Japan. At the recommendation of Julius Overhoff, he rejoined BASF in 1955, working for the company outside the country at first. After moving to the banking department in Ludwigshafen (1957), he did much to stimulate BASF’s accelerated expansion, to stabilize it financially in the 1960s, and to create effective financial instruments for the acquisition policy then emerging at home and abroad. It was Magener, however, who recognized BASF’s

⁵⁹ Minutes of an interview with Prof. Matthias Seefelder, December 2, 1999; BASF UA, W 1.

⁶⁰ Ibid.

leadership style as one “of an operation dominated by technocrats.” He also saw the potential danger of a decentralized decision-making structure largely uncontrolled by top management and oriented solely to the criteria of technological feasibility and desirability.⁶¹ The long 1950s, with their permissive economic conditions – the “economic miracle” and booming world markets – had pushed this matter into the background because, according to Magener, they allowed even “excessive notions of the necessary investments” to be absorbed. Not until the end of this period did the inadequate linkage between business strategy and technological structure emerge as the main problem of BASF’s leadership.

Consistency and Flexibility: Financing

After the Farben trust had been seized and taken over in November 1945, the individual groups of factories no longer had the services of the central finance department in Berlin. In 1954 BASF finally re-established a banking department, placing it under Willi Helfert, the deputy director and “chief accountant.” The new organizational unit prepared the financial plan with not only the sales department but also the engineering department, which had been brought together in the 1920s from individual engineering and construction staffs. As in the past, though, the tone was set by the departmental accountants, who supplied the foundations for a rudimentary finance department.⁶² Of course, the demands that the conditions of the 1950s placed on financial planning and on the development of a finance system were simple and relatively easy to grasp. At first, BASF’s financial plan developed strictly according to certain cornerstones. A total of DM 60 million in depreciation was available for investments in 1953. But Wurster felt it justifiable to exceed that sum by DM 10 to 12 million “because our investments have lagged behind our depreciation by about that amount since the currency reform.”⁶³ On the other hand, repair costs fell from DM 140 million in 1952 to DM 100 million (1953). They were still unusually high because reconstruction gave them the character of quasi-investments. Combined with decreasing production costs and increasing turnover, however, their decline widened the latitude for financing the first dividends, whose payment at the planned rate of 6 percent would have required a gross profit of DM 100 million or more. The only cornerstone impossible to achieve in the financial plan for 1953 was the third one: no touching of the committed reserves, not even to cover burden sharing. But drawing down the reserves was precisely what was needed in order to pull even with Bayer and Hoechst, which planned a dividend of 7 percent. With uncommitted reserves of just under DM 130

⁶¹ Minutes of an interview with Dr. Rolf Magener, December 3, 1999; BASF UA. ⁶² Ibid.

⁶³ Minutes of the managing board meeting of June 15, 1953; BASF RA.

Table IV.2. BASF's *Financial Plan, 1954*

Item	Approximate Investment (in millions of DM)
Depreciation	50
Reserves for financing retirement	40
Declared securities on December 31, 1953	6
Declared bank balance on December 31, 1953 in excess of dividend payment	10
Additional loans	24
Total	130

million, it seemed legitimate to use part of that sum for the burden-sharing capital levy of DM 7.2 million.⁶⁴

The main financial objectives for the first dividend year were thereby achieved with almost no outside financing. Up to that point, bank loans had been taken out only with commodities as collateral. Favorable investment loans, such as those offered by the German Marshall Plan bank, were not refused, especially since Heintzeler persuaded that institution to drop its request for real estate collateral if BASF treated all financial institutions likewise in this respect.⁶⁵ In addition, all borrowing agreements were negotiated to allow advance repayment of the loan amount. The price of this liquidity buffer was manageable because the interest paid was tax deductible. Although the volume of BASF's investment had doubled in the meanwhile, the company covered its financial plan mostly from its own resources in 1954 as well (see Table IV.2).⁶⁶

Not even the extra loans had to be taken out in the banking system. At least DM 13 million in loans were promised by IG Farbenindustrie AG in Liquidation, quite apart from BASF's own retirement fund, which could make another DM 20 million available to the company. Moreover, the financial plan deliberately excluded the fact that the portion of the profit needed to pay the dividend for 1954 and tax arrears for 1954 and 1955 would accrue as further liquid funds during the year.

As of the mid-1950s, the sustained boom on world markets and at home radically challenged the pattern of growth and financing underlying this planning. Asked in April 1955 about "long-term business prospects," Julius Overhoff, for all his caution about price trends, unreservedly told the managing

⁶⁴ Financial statement, December 31, 1953, BASF annual report for 1953.

⁶⁵ Minutes of the managing board meeting of December 20, 1954; BASF RA.

⁶⁶ Minutes of the managing board meeting of June 21, 1954; BASF RA.

board "that placing even sizeable quantities of production is not a concern."⁶⁷ Although the managing board had thus far hedged every investment decision by reserving the right to adjust quickly to new facts "in case of an unexpected turn in business development,"⁶⁸ even the wary chairman now realized that BASF was acquiring new dimensions that could no longer be financed from the company's own resources alone. The volume of programs and repairs occupying the engineering department had expanded from DM 220 to 344 million in 1954 more or less of their own accord. Sales in the first six months of 1955 surpassed those of the same period in 1954 by 20 percent. The share of sales accounted for by exports rose by more than 40 percent. The tanker accelerated, compelling the captain to adapt to these dynamics. Just the foreseeable investments still manageable by the engineering department came to DM 200 million for each of the years 1955 and 1956, sums that BASF could not finance on its own. With only DM 160 million in depreciation to offset the new investments, the budget showed a surplus DM 240 million.⁶⁹ A great deal of capital also had to be figured in for foreign and domestic participations and similar investments. The joint venture with Shell in the Rhenish Olefin Works (ROW) needed DM 25 million; the joint venture with GBAG to build a phthalic acid plant in Bochum, DM 7 million; various participations abroad, DM 12 million; for domestic ones, upwards of DM 50 million – all told another DM 100 million. There was also the growth-related increase in current assets, which was calculated to be DM 45 million for inventories and DM 25 million for accounts receivable, apparently bringing total capital requirements for the two years to DM 410 million.

After deduction of the planned 8 percent dividend, that sum was listed opposite anticipated net profits of DM 75 million and allocations for pension plans, which were economically equivalent to equity (DM 17 million); credit from IG Farben AG in Liquidation, which could be regarded as long-term investment credit (DM 45 million); tax credits on earnings (DM 18 million); and the increase in trade account payables (DM 25 million). A total of DM 180 million could thus be financed without turning to the capital market or the banking system.

The implications of this rough calculation were evident. If BASF had covered its additional capital requirements of DM 230 million by the end of 1956 solely by taking on more debt, share capital would have shrunk from 40 percent of the balance sheet total to 26 percent, bringing about an unhealthy and optically unfavorable relation between the two figures. It also appeared desirable to maintain equity at the level of fixed assets if not higher.

⁶⁷ Minutes of the managing board meeting of April 4, 1955; BASF RA.

⁶⁸ Minutes of the managing board meeting of June 21, 1954; BASF RA.

⁶⁹ "Kapitalbedarf der BASF in 1955/1956 und seine Deckung," March 19, 1955; BASF UA, C 21.

Doing so would require at least a further DM 147 million in equity. For that reason, the managing board and the chairman of the supervisory board went along with the conclusion that the planners of the banking department drew from their forecast: "To a certain degree, a capital increase by the end of 1956 is thus unavoidable, although share capital is still the most expensive money." It seemed appropriate to raise share capital to DM 455 million or more, a sum corresponding to subscription rights at a ratio of 3:1. Hoechst Dyeworks (Farbwerke Hoechst) had recently proposed this relation to its shareholders, likewise in order to secure all the options opening up "with the reacquired freedom of trade."⁷⁰ The issue price of Hoechst's new shares was 125 percent. By contrast, the Ludwigshafen banking department weighed early on "whether a heftier capital increase" should be sought in order to cover all conceivable contingencies. The cash requirements for trade investments were especially difficult to estimate. The proposal to the managing board therefore comprised not only the cautious 3:1 variant but also a more inclusive solution giving BASF shareholders subscription rights of 5:2.⁷¹

When the managing board addressed the matter two weeks later, everything pointed to expansion. All anxious speculation about a sudden end to the postwar boom seemed to have dissipated completely. The world economy appeared to provide insatiable sales markets to anyone able to adapt production capacity to the galloping pace of development and maintain competitive prices. Both paths required huge investments, whose profitability nevertheless seemed guaranteed. The managing board courageously set aside the proposals of its banking department and asked for the "broadest possible capital base at the most favorable possible terms."⁷² This move put the question of a 2:1 capital increase on the agenda for further consultations with Hermann Josef Abs, who ultimately urged the 652 shareholders who attended the general meeting in Ludwigshafen's city auditorium on July 15, 1955, to approve the "resolution to increase the share capital of DM 340.1 million by DM 169.9 million to a total of DM 510 million at a price of 120 percent plus stock exchange turnover tax with dividend warrant of the new stocks beginning on July 1, 1955."⁷³ The issue price was lower than that for Hoechst's new stock offering. This decision, as Abs intimated, had not come about "without a sidelong glance at our big neighbor" and was primarily intended to take account of the heavy strain on the capital market. Ten years after World War II, that market had not yet completely recovered from the

⁷⁰ Dietrich Schäfer (tax lawyer in the legal affairs department), "Aktenvermerk, betr. Bericht über die außerordentliche Hauptversammlung der FARBWERKE HOECHST AG," March 1, 1955; BASF UA, C 21.

⁷¹ "Kapitalbedarf der BASF in 1955/1956 und seine Deckung," March 19, 1955; BASF UA, C 21.

⁷² Minutes of the managing board meeting of April 4, 1955; BASF RA.

⁷³ Rechtsabteilung (Legal Affairs Department), "Protokoll der Hauptversammlung vom 1. Juli 1955," Ludwigshafen, July 7, 1955; BASF UA, C 21.

burdens of the Nazi period and the currency reform. Fragile though it still was, though, it now easily absorbed the capital increase of IG Farben's three successor companies and proved itself for the first time.

The capital increase flooded BASF's coffers with approximately DM 200 million. The financial plan of spring 1955, however, turned out to be a waste of paper just half a year later. By late 1956, signs indicated that gross proceeds might unexpectedly decline. Ultimately, they did, contracting by 13 percent from DM 316.6 to 274 million.⁷⁴ The volume of the approved investment programs had swelled to DM 400 million, of which DM 250 million was to be paid in 1956. This decision was based on the assessment that the decrease in proceeds did not so much reflect a sustained cyclical decline as the inability of BASF to respond quickly enough to the expansion of important product markets by expanding capacity. BASF therefore feverishly continued developing certain old and new "strategically" significant products – particularly caprolactam and hexamethylenediamine salt of adipic acid (AH salt), which are both primary products for synthetic fibers; Styropor® (foaming polystyrene marketed by BASF); impact-resistant polystyrene; and polyvinylchloride (PVC) as important raw materials for plastics – and the compound fertilizer Nitrophoska in agrochemicals.⁷⁵ In April 1955 the managing board decided to spend DM 25 million to incrementally augment production capacity for AH salt to 800 tons a month. In August 1956 it ordered the expansion to be accelerated to 1,200 tons a month.⁷⁶ The steep decline in profits was not blamed on overcapacity but rather on the fact "that most products are subjected to excessive strain in their utilization, so top-quality products not only fail to show digressive cost development, they often involve cost increases." Hence, still further expansion loomed ahead whether or not it entailed new financing problems.

With depreciation of about DM 100 million and capital needs for current assets and participations, BASF saw a gap open in its finances, one that ranged anywhere from DM 140 million if costs were strictly managed to approximately DM 200 million if calculated generously. It especially hurt that the drop in earnings for 1956 recommended against any self-financing that used funds set aside for pensions. The thought of an additional capital increase was entertained but quickly rejected.⁷⁷ A two-year moratorium on issues of new shares seemed necessary so as to avoid undue strain on the capital market. For the first time since its refounding, BASF had to turn to the credit market, and top management concurred that "all paths promising

⁷⁴ Heintzeler, "Schätzung des voraussichtlichen Jahresergebnisses 1956 der BASF AG mit Vergleichszahlen 1955," Ludwigshafen, November 29, 1956, attachment 1 to the minutes of the managing board meeting of December 3, 1956; BASF RA.

⁷⁵ Minutes of the managing board meeting of July 16, 1956; BASF RA.

⁷⁶ Minutes of the managing board meeting of August 31, 1956; BASF RA.

⁷⁷ Minutes of the managing board meeting of January 16, 1956; BASF RA.

success are to be taken." The managing board also consented to "cautious inquiries about the possibility of borrowing in Switzerland or the United States."

The credit market was soon found to be tight. The unconventional sources on which the managing board pinned a modicum of hope were unforthcoming. The Bank deutscher Länder (BdL), the forerunner of the Bundesbank, the West German Central Bank, opposed the idea of taking out loans abroad. It did not want to relinquish its control over capital before the convertibility of European currencies had been re-established, something that did not exist before December 1958, however. The BdL board of directors were willing to consider permitting an exception only "if the loan amount were to be used to acquire machines and equipment from abroad."⁷⁸ Recourse to "institutional investors" (loans from private and public insurance agencies) was similarly difficult. Allianz, the first insurance company to be approached, was unwilling to approve more than DM 10 million and attached "serious insurance-related conditions" to its terms.⁷⁹ The Gerling Group, as leader of the BASF consortium of insurance companies, called on all members to float a loan of up to DM 40 million. The result was pitiful. Beyond DM 6 million from the Gerling Group's own resources, only DM 3 million came in.⁸⁰ The loan offers from the public insurance companies, such as the Nuremberg Federal Agency for Employment Services and Unemployment Insurance (DM 12 million) and Berlin's Federal Insurance Agency for Employees (DM 11 million), fell far below expectations. BASF's affiliated banks, which constituted the "little bank consortium" led by the Ludwigshafen branch of the Bavarian State Bank, did contribute DM 30 million. A total of DM 10 million more came from the Bavarian State Bank in Munich and DM 5 million from the Rheinland-Palatinate State Bank in Kaiserslautern. It all added up to only DM 77 million, leaving an unmet capital need of about DM 63 million.

The managing board tried once again to find foreign lenders in order also to profit from the lower interest rates outside Germany. Walter Ludewig had meanwhile explored the possibility of having between DM 40 million and DM 50 million in contracts for the 1956-7 investment program transferred abroad so as to meet the BdL's criterion for approval of foreign loans.⁸¹ But with foreign capital goods likely to be 20 to 25 percent more expensive, the advantage of the interest rate would be partly eroded. "Given the worsening difficulties of raising money within Germany," the managing board nevertheless felt that "priority shall be placed on assessing the possibilities of procuring a foreign loan for the import of capital goods."⁸² Rolf Magener, working in London as the managing director of the Alkahest foreign trade

⁷⁸ Minutes of the managing board meeting of May 28, 1956; BASF RA.

⁷⁹ Minutes of the managing board meeting of June 29, 1956; BASF RA.

⁸⁰ Minutes of the managing board meeting of July 16, 1956; BASF RA. ⁸¹ Ibid.

⁸² Minutes of the managing board meeting of June 29, 1956; BASF RA.

company, thus received authorization to continue negotiations there for a loan of \$10 to 12 million. Other potential loans by American lenders lined up by Richard Metz, who represented BASF interests in the United States, came to nothing because of the conditions attached to them. BASF could not legally approve the issue of convertible bonds, in which several sizeable investment trusts were interested, nor was it prepared to pledge any of its foreign assets to an insurance company, "since [they] have to be reserved as a credit basis for foreign investments."⁸³

BASF therefore had to fall back largely on the German credit market, where it depended for the first time on the assistance of the banks. Meanwhile, the company's financial situation had deteriorated, complicating the acquisition of even relatively modest tracts of land between Rottstückweg and the factory's horticultural center. At any rate, Overhoff took the purchase of these plots as occasion to warn his fellow board members "that such fairly great, unforeseen expenditures represent a danger to the BASF budget." He requested that "such unusual expenses in future be communicated to Helfert at an early stage for integration into the financial plan."⁸⁴ The managing board also imposed the first measures to restrain the self-sustaining dynamics of the investment program. In January 1956, Wurster had the board henceforth require formal approval for new projects. In September, he responded to the company's continuing financial squeeze by declaring "that from now on the major projects to be approved will each be accompanied by a statement from the sales department, Aweta, and the central office."⁸⁵ Eventually, the managing board even pulled the emergency brake by putting a freeze on hiring, a decision that was widened in September to include the outside firms engaged in Ludwigshafen.

It therefore seemed opportune to bridge the DM 63 million finance gap and avoid the looming crisis by following up on an earlier lending commitment of BASF's "big bank consortium," even though it was not due until 1957. Individual banks retreated to this promise, as did the Rhine-Main Bank (Dresdner Bank), when BASF approached them for credit.⁸⁶ As a result, Wurster and Timm finally sat down in August 1956 with the many members of the consortium led by the Süddeutsche Bank (Deutsche Bank) and had to negotiate the loan grant. The consortium either would not or could not accept the simple solution of moving its loan commitment up by one year. Instead, Abs suggested floating a DM 100 million BASF bond. At an interest rate of 8 percent, a payout of 98 percent, and costs of 10 percent, the conditions corresponded to an actual payout of 93 percent and an effective rate of about 9 percent. As security, a change equivalent to 30 percent of the time value

⁸³ Minutes of the managing board meeting of September 17, 1956; BASF RA.

⁸⁴ Minutes of the managing board meeting of July 16, 1956; BASF RA.

⁸⁵ Minutes of the managing board meeting of September 17, 1956; BASF RA.

⁸⁶ Minutes of the managing board meeting of June 29, 1956; BASF RA.

of the investment was entered. The first five years of the 20-year repayment period were redemption-free. To preserve BASF's own freedom of maneuver, the members of the top management accepted the idea only on the condition that this bond could be called in and made repayable after five years, an arrangement of which they actually availed themselves in connection with a conversion offer. Wurster and Timm also pushed for the loan amount to be raised to DM 125 million. Their preview of BASF finances had told them that they were still under "pressure to invest" (as Wurster put it) because the planned volume of investment continued to expand unabated.

At last, BASF agreed to this broader solution, but the matter did not end there. Regulations in that period required loan approval from no fewer than three of Germany's federal ministries, two state ministries, and the Federal Supervisory Agency for Banking. The latter finally agreed to a charge of up to 40 percent of the fixed assets. With the Ludwigshafener installations having a replacement value of DM 2 billion, the time value of the investment was around DM 1.29 billion. This sum promised sufficient collateral for a loan of up to DM 516 million, DM 125 million of which were then taken for the loan and DM 52 million for the collateralization of an additional loan from the German Marshall Plan bank. The road was paved for a long-term credit line.

Even before the loan was wrapped up, preliminary discussions began with the leader of the consortium (the Süddeutsche Bank) and its spokesman, Hermann Josef Abs, in order to keep other credit options open.⁸⁷ The intention was to ensure "that the hitherto promised funds of up to DM 100 million can be received by BASF in the second half of 1957 or early 1958 as credit from the banking consortium." Simultaneously, preparations were made for another capital increase of DM 102 million in May 1957. Investment programs totaling DM 250 million had accumulated, and further applications totaling DM 100 million were expected for 1957. In order to respond appropriately to this pressure to invest, it seemed necessary to exploit all available sources of funding.

BASF took this path in stages keyed to the particular investment need in question and to the alternatives available on the capital market. The company continued to rely chiefly on its own cash flow for funding, that is, on self-financing from depreciation and earnings. Although this method soon proved inadequate for protecting BASF's competitiveness and chances for growth, it remained the foundation of BASF's relative independence from banks and financial markets. The cash-flow system later also served for many years as the main instrument for financing BASF's foreign participations and subsidiaries, whose sources of outside funding were meager at first.

The second pillar in the financial system of BASF consisted of its 175,000 shareholders (1960), who at very regular intervals had supplied the company

⁸⁷ Minutes of the managing board meeting of August 31, 1956; BASF RA.

since 1955 with the capital needed for its rapid expansion. During the long 1950s, BASF played on this instrument with a virtuosity it owed not least to Abs's skill as a conductor in his role of supervisory board chairman. The innovations that BASF pioneered on the German capital market ranged from issues at a premium and issues of "young stocks" with a subscription price near market value to the precautionary creation of "authorized capital."

By contrast, the company's relations with the private banking system were rather reserved. Fully half of BASF's loans from domestic banks in 1957 was confined to the German Marshall Plan bank, a public financial institution not suspected of trying to influence the business policies of its clients. Foreign creditors accounted for scarcely more than 7 percent of the loan volume. Above all, more than two-thirds of all BASF's bank debt was long term in nature, essentially because the credits from the German Marshall Plan bank represented much of the total. The total sum of the loans from the banking system only slightly exceeded the volume of BASF's own deposits required in order to maintain sufficient liquidity.⁸⁸ BASF later even developed a "liquidity exchange" with other prominent enterprises, such as ESSO AG, Salzgitter AG, Shell AG, and ROW in order "to get hold of [short-term funds] more cheaply by not involving the banks" and to invest the money more lucratively "than has been possible thus far."⁸⁹ These practices and conditions of BASF's financial system differed in a decisive way from those that characterize the financial system of the German production regime more than any other to this day.⁹⁰ The large banks never regained the influence they had lost over the major chemical companies even before the era of the trusts. The classical affinity between big business and big banks did not influence the function of the supervisory board, nor was it the dominant financial institutions that provided BASF with ways and means for long-term funding.

The outstanding part that Hermann Josef Abs played as chairman of the supervisory board in the development and stabilization of BASF's financial system is consistent with this picture. Abs represented three BASF lines of connections at once. First, he was personally linked to the big chemical industry because he had been the only banking representative in the supervisory board of IG Farbenindustrie AG. The competence that made his counsel so valuable thus extended far beyond financial questions. Second, he was the president of the German Marshall Plan bank, a function that enhanced the business relations between that Marshall Plan institution in Frankfurt and

⁸⁸ Bankabteilung (Banking Department), bank balance and bank loans and overdrafts as of December 31, 1957; BASF UA, C 21.

⁸⁹ Minutes of the managing board meeting of February 19, 1962; BASF RA.

⁹⁰ Soskice, *Globalisierung*. On the relationship between banks and heavy industry, see also Wixforth, *Banken*.

BASF. Third, he was the undisputed informal head of the Deutsche Bank, which the Allies had broken up – a position he occupied until he advanced to become speaker of the re-established bank in 1957.

Seen from another angle, BASF's financial system closely resembled the pattern of the German production regime. Although it was not Abs's responsibility as chairman of the supervisory board to exercise control in the interests of each bank he represented, he did act in the shareholders' interests, which he understood very well, by organizing a stable structure of BASF ownership as a foundation for the enterprise's financial system. That system had to unite what at first glance seemed like two contradictory characteristics: (a) the long-term nature of strategic corporate objectives, which required the development of structures that could ensure the quality of both the company's personnel and its material resources, and (b) the short-term nature of technological developments, which demanded tremendous flexibility of every entrepreneurial decision made within the long-term context. The common denominator that made these two characteristics compatible with each other was the financial independence of the entrepreneurs involved. Given BASF's ownership structure, this fact meant that the utility functions of owners and management had to be identical to a great extent. On this basis, durable, long-term cooperation grew between BASF and its owners during the long 1950s, a relationship that granted the company generous time and scope for action.

Control and Trust: Shareholder Relations

For 11 years – from 1943 to 1954 – the shareholders of IG Farbenindustrie AG were unable to exercise their rights as owners. Yet they were not completely irrelevant in the disputes surrounding the breakup of the IG Farben trust. After all, the political actors, particularly on the Allied side, constantly reminded them of the inviolability of private property. This message was sure to be heard if only because around 17 percent of the 138,000 trust shareholders were non-German. With the stocks spread so widely, effective organization of the owners' interests could not be taken for granted, especially since the trust's shareholders, too, were publicly suspected of having profited from a criminal enterprise.

Nevertheless, tens of thousands of IG Farben shareholders, who represented approximately 40 percent of the total capital, were in the Federation of Associations for the Protection of Shareholders led by former undersecretary Schmid. It organized large demonstrations, published propaganda materials, commissioned American experts and lobbyists to represent the interests of shareholders, and negotiated with the antitrust authorities in order to lobby for the creation of more competitive operating units as successors to the trust and to preclude the “intermittently quite critical danger that the trust's assets

would be atomized or even sold at dumping prices in West Germany.”⁹¹ The federation believed that its activism, which sometimes entailed a risk under the exceptional legal conditions of the occupation period, endowed it with sufficient legitimacy “to have an influential say in representing shareholder interests pertaining to the successor companies.” Schmid, who served on BASF’s supervisory board from the company’s refounding to his death in 1955, recognized that the position of the shareholders was extremely weak after such a long interval, especially because its attrition had already begun with the German Stock Corporation Act of 1937. He also realized, however, that their bargaining power would improve overnight “if the companies soon had to turn to the capital market to cover their financial needs and had to return to providing intensive customer service to the shareholders.”⁹² It would then at last be the federation’s moment to assert the “main wishes” of his fellow shareholders as far as the successor companies were concerned.

First, Schmid wanted to see a dividend “that represented an appropriate return and acknowledged the risk of all shareholding.” On the eve of the “great tax reform,” which went into effect on January 1, 1955, and which, among other things, lowered the corporate tax rate from 60 to 45 percent, the shareholders believed they saw broadening latitude for a “consistent and accommodating dividend policy.” Schmid was willing to guarantee the support of his protective associations for new issues of stocks only if such a policy were “absolutely ensured.” Second, the federation demanded that greater account be taken of “representatives of the shareholders” in the upcoming elections to the supervisory boards. Third, he wanted “the key stewards of German economic life to actively confirm their amenability to and interest in the shareholder.” He wished to see the shareholder and “his social circumstances” be “given sufficient attention” in annual reports and company newspapers. The owners called upon the factories to show them more “civility” in general. Lastly, the federation proposed that the listing of the shares be promoted at important foreign stock exchanges. Alluding to the BdL’s restrictive policies, the federation requested an effort to overcome the “disapproving stance that certain German authorities have taken on this problem from the start.” It regarded the rather detailed disclosure requirements of the New York Stock Exchange as the guideposts “that will be imitated in other countries, too, sooner or later.” The federation believed

⁹¹ “Pressebesprechung der Arbeitsgemeinschaft der Schutzvereinigungen für Wertpapierbesitz in Düsseldorf am 8. Juli 1954, betr. Erstmaliges Wiederauftreten der Aktionäre in den Hauptversammlungen der IG-Farben-Nachfolgegesellschaften am 15. bzw. 20. Juli 1954 – Anregungen und Forderungen der Arbeitsgemeinschaft der Schutzvereinigungen” [Press discussion by the Federation of Associations for the Protection of Shareholders in Düsseldorf on July 8, 1954, re: The First Reappearance of the Shareholders in the Shareholders’ Meetings of the Successor Companies of IG Farben on July 15 and July 20, 1954 – Ideas and Demands of the Federation of Associations for the Protection of Shareholders]; BASF UA, C 21.

⁹² Ibid.

itself well prepared to accomplish these objectives. Schmid was convinced “that it is no problem, say, for us to mobilize minorities that may be necessary and that it would scarcely be conceivable to organize a qualified majority against us.”

The practice at the shareholders’ meetings and on the supervisory boards of the companies that succeeded the Farben trust soon revealed how unrealistic this notion of organized shareholder power was. Control over the voting rights of the small shareholders, who held most of BASF’s shares, did not lie with the Federation of Associations for the Protection of Shareholders or other shareholders’ organizations but rather with the banks that held the securities accounts. At BASF’s second ordinary shareholders’ meeting in July 1954 – the first to be attended by the shareholders – Schmid turned out to be a general without troops because he commanded only 1.1 percent of the capital represented at the meeting.⁹³ The large banks wielded the voting rights of 61.47 percent of the capital represented, and far more than half of that portion (38.93 percent of the capital) was accounted for solely by the successors of the Deutsche Bank. All told, the banks held a total of 77.8 percent of the capital represented at the meeting, leaving the independent shareholders with 22.2 percent of the vote. The latter block included two prominent interests: the 8.78 percent stake held by Leopold Baron von Schrenck-Notzing for the old founding families and the 4.6 percent stake consisting in DM 213,359,200 of the capital shares from IG Farbenindustrie AG in Liquidation as represented by the people assembled at the meeting. Moreover, the individual shareholders accounted for significantly less than 2 percent of both the represented and total capital, a relation that never changed through the long 1950s.

The dominance of the Deutsche Bank’s successor institutions had already been apparent from the application for registration in the share register. For the sake of control, the Americans insisted that the shares of the trust be exchanged for registered shares of the successor companies and not, as customary in Germany, for securities issued to anonymous holders. This exchange, which dragged on well into the summer of 1954, took place for 51.3 percent of the share capital of IG Farbenindustrie AG held by the Deutsche Bank Group.⁹⁴ By contrast, the underwriting share that had been approved for the bank in relation to the DM 1.05 billion in total capital represented by the four successors of the trust was only 27.69 percent. Wurster was “naturally [highly pleased] about this strong position of the Deutsche Bank Group” led by his chairman of the BASF supervisory board. Abs, too, inferred that this “vote at the exchange offices” gave his bank a legitimate

⁹³ “Bei der 2. Ordentl. Hauptversammlung der BASF am 15.7.1954 vertretenes Kapital, Zusammenstellung vom 26.8.1954” [Capital represented at BASF’s second ordinary shareholders’ meeting, July 15, 1954, compilation of August 26, 1954]; BASF UA, C 21.

⁹⁴ Abs to Wurster, Frankfurt am Main, June 11, 1954, attachment; BASF UA, C 21.

right to have a say in the shareholder affairs of IG Farben's successor companies.⁹⁵ With this shift of influence from the shareholders' associations to the banks, it was symptomatic that a political banker – Hans Karl von Mangoldt-Reiboldt, the president of the European Payments Union – rather than a representative of an association filled the vacancy that Schmid's death left in the arithmetic of interests on BASF's supervisory board in 1955. Not until 1958 did a representative of organized shareholder interests, the stock-market journalist Aloys Wihr, take a seat on the supervisory board of BASF. By then, the methods and substance of shareholders' opposition at the shareholders' meetings had undergone fundamental change owing partly to BASF's "stylistic" contribution.

Schmid's forecast that the growing capital needs of the trust's successor companies was bound to improve the shareholders' bargaining position likewise turned out to be wishful thinking. All the same, BASF sought one capital increase after another as of 1955, and the more imagination the corporate boards showed in the conditions they attached, the livelier the debates became at the shareholders' meetings. The issue price elicited particularly vigorous objections each time, beginning in 1955 with the first capital increase. On that occasion, BASF set it at 120 percent with a current price of 280 percent. For the 1959 capital increase, the board oriented the issue price more to the stock market: 300 percent at a current price of 460 percent. For all the criticism of issuing shares at a premium, the voting patterns revealed a clear picture. The capital increase of 1955 was accepted with 2,829,752 votes cast by the 652 shareholders who attended the meeting. Abs, who was chairing the proceedings, noted the scale of opposition with satisfaction: "38 votes, with no zero following."⁹⁶ He took this result as refutation of the criticism from the Association for the Protection of Small Shareholders (*Schutzgemeinschaft der Kleinaktionäre*) that "the shareholder is simply left out in the cold."

Abs did not look upon a stock subscription price of 120 at a current price of 280 as "leaving anyone out in the cold as I understand it." In the much more heated dispute over the "stock-market-oriented" 300 percent issue in 1959, the opposition received only 10.4 percent of the votes at the shareholders' meeting, which had expanded to 2,000 people.⁹⁷ Although the magnitude of that dissent was highly unusual in big public corporations then, the reality was that the representatives of organized shareholder interests still agreed overall with the managing board that BASF "should achieve

⁹⁵ Ibid. and Wurster to Abs regarding the exchange of IG Farbenindustrie shares, June 16, 1954; BASF UA, C 21.

⁹⁶ Rechtsabteilung (Legal Affairs Department), Protokoll der Hauptversammlung vom 1. Juli 1955, 10.30 Uhr im Pfalzbau; BASF UA, C 21.

⁹⁷ "BASF nahm Hürde der 300-Prozent-Emission," *Handelsblatt* (Düsseldorf), September 28, 1959, p. 12.

the state of development that will make it a competitive, indeed a leading enterprise indefinitely.”⁹⁸ The “pure speculator” was precisely not the figure the Association for the Protection of Private Shareholders had in mind. Instead, it saw the shareholder as “the owner of savings who has recognized stocks as an attractive security[,] as a long-term investment that simultaneously gives him a link with substance, with the assets of the company.” This image fostered concordance with the corporate management in arguing for a “constant, cumulative dividend policy commensurate with the company’s economic situation and prospects.” In principle the Association for the Protection of Small Shareholders agreed with these goals but saw the specific interests of small shareholders to lie also in providing sufficiently for their retirement, planning that “had to rely on using the dividends to purchase new securities.”

From the perspective of the long 1950s, it really did seem possible to reconcile the interests of the two sides. At the shareholders’ meeting of 1959, the managing board pointed out that BASF shareholders had received an average annual net dividend (i.e., including subscription rights and after deduction of capital-gains tax) of 16.16 percent.⁹⁹ Conversely, the company had succeeded at receiving more capital back from its shareholders than it had distributed to them in earnings. By 1961, DM 515 million had been disbursed to the shareholders, whereas BASF had grossed DM 896 million in capital increases. Against this background the management did not have to fear a revolt that would have forced it to adapt its business strategy to specific shareholder interests. In practice, the shareholders of the company acted like stakeholders, though they had no say in the business strategy as classical principal shareholders did. This situation was true not only for the individual small shareholders typical of BASF’s ownership structure but also for the banks that exercised a proxy right for them at the shareholders’ meetings. Nor did the banks have an influence on the business policies of the Ludwigshafen managing board, aside from the leadership of the supervisory board, a constellation that was more a product of company history than of vested interests.

According to BASF’s articles of association, the supervisory board was responsible for all “transactions of overriding economic significance.”¹⁰⁰ They had to have the board’s consent “if they go beyond the scope of routine

⁹⁸ Rechtsabteilung, Protokoll der Hauptversammlung vom 1. Juli 1955, 10.30 Uhr im Pfalzbau; BASF UA, C 21.

⁹⁹ Welche Rendite hatte der BASF-Aktionär aus seinen Aktien seit der Neugründung der BASF im Jahre 1953 im Zuge der IG-Farben-Entflechtung? Unterlagen zur HV 1959 [What return have BASF shareholders had on their shares since BASF was refounded in 1953 in the course of the breakup of IG Farben? Documents for the 1959 shareholders’ meeting]; BASF UA, C 21.

¹⁰⁰ As formulated in §10 of BASF’s articles of association in accordance with the decision of the founding assembly of January 30, 1952; BASF UA, C 31/1.

business operations." Upon assuming their duties, the members of the supervisory board empowered their chairman to act in the board's name in several matters. In September 1953, for example, they "unanimously decided to authorize [the] chairman to settle personnel matters of the managing board in the name of the supervisory board but reserved the right to appoint and remove members of the managing board.¹⁰¹ Similar powers were expressly or tacitly delegated in other areas under the supervisory board's purview. The supervisory board meetings, which were normally held quarterly, dealt with individual issues of management only in the context of the reports that the managing board chairman gave on the "business situation" or on important financial transactions, such as loans or capital increases. The supervisory board was thereby prepared for pending decisions of the managing board, or was at least informed afterward of the bases for decisions of "overriding economic significance" that the chairman of the managing board had discussed in advance with the chairman of the supervisory board.

At first, such consultations naturally centered mainly on the modalities of BASF's refounding and disincorporation, such as considerations bearing on the amount of share capital to be set and negotiations on what initially appeared to be a BASF participation in the Auguste Victoria mine. From the outset, however, Wurster solicited Abs's guidance on operational questions as well, such as the nitrogen project with Turkey (the financing of which was later taken over by the German Marshall Plan bank) and the status of negotiations with Shell AG on a joint venture in Wesseling, one of the early crossroads in BASF business policy.¹⁰² Financial issues ranked high on the agenda but did not dominate it completely. Abs was not directly involved in all chief matters by any means. He ordinarily contented himself with being informed of details immediately after conclusion of a noteworthy contract.¹⁰³

Nonetheless, this supervisory board chairman did more than just advise and monitor the managing board. He additionally undertook a certain degree of independent action when it came to protecting BASF's interests. His knowledge of the market was often crucial to the early detection of opportunities for trade investments, for which BASF kept an eye out from the mid-1950s on – albeit only sporadically at first.¹⁰⁴ The managing board also accepted Abs's occasional anticipatory interventions in transactions on behalf of BASF. During the preliminary stage of the joint venture with Gelsenkirchen Bergwerks AG, for example, it became known "that Herr Abs has evidently already made extensive commitments for BASF."¹⁰⁵ Within

¹⁰¹ Wurster to Abs, "betr. Aufsichtsratssitzung der BASF," October 3, 1956; BASF UA, C 21.

¹⁰² Wurster to Abs on February 7, 1952; BASF UA, C 21.

¹⁰³ Wurster to Abs, "betr. Stromvertrag BASF/RWE," March 3, 1953; BASF UA, C 21.

¹⁰⁴ Timm, "Aktennotiz, betr. Anruf von Herrn Abs am 29.3.1956 14.30 Uhr"; BASF UA, C 21.

¹⁰⁵ Minutes of the managing board meeting of November 2, 1954; BASF RA.

the circle of BASF's highest leaders, Abs thereby performed entrepreneurial functions on a limited scale as well, affording Wurster and Timm an exceedingly competent and reliable source of information whose contribution to the quality of the entrepreneurial decisions by BASF's top management should not be underestimated.

The managing board likewise saw Abs, who was the German federal chancellor's advisor on economic and currency policy, as a pivotal mediator between BASF's problems and the political establishment, a role quite beyond his position as chairman of the supervisory board. At irregular intervals Wurster therefore thoroughly informed Abs about contemporary developments in the chemical industry and familiarized him with the politicoeconomic difficulties besetting the sector and the company.¹⁰⁶ Wurster commonly touched on problems of international competition that were arising for the chemical industry because of West Germany's role as a pioneer of autonomous tariff reductions. Other issues included the emphatically liberal economic policies of the time and the liberalization of the markets both within the Organization for European Economic Cooperation and in relation to the dollar area. For all the agreement in principle with the West German government's proposals for tariff reductions, which in the mid-1950s amounted to 30 percent, Wurster also recommended that the chemical industry keep up its long-successful pressure to win an exemption from section 39 (plastics) because of that provision's industrial meaning as a protective tariff.

Another long-standing controversy concerning the chemical industry since the mid-1950s was export surpluses, an imbalance due in good measure to BASF, among other things. The company regarded the resulting upward pressure on the Deutsche Mark as a serious threat to its own earnings, so it seemed wise to mention the alleged fragility of the trade balance to Abs in the production context as well. Abs was believed in Ludwigshafen to have an open ear for matters of promoting research. When the German Federal Armed Forces were being organized, Wurster was particularly "shocked" about "how scarcely a word is lost on billions being spent on military things, whereas research costing a fraction that much require the most urgent appeals, are talked to death, or shelved." Here, as in other areas of economic policy, Wurster repeatedly tried to bring in Abs as a confederate in the struggle against dangers resulting from "incomprehensible short-sightedness and irresponsible dilettantism." It is difficult to assess how much this lobbying by the chairman of the supervisory board had any tangible effects on the overall conditions framing economic policy at BASF.

Abs was an ideal-type representative of all those functions that justify the dualism of managing board and supervisory board in the established corporate structure of large German enterprises to this very day. In the interest of

¹⁰⁶ A typical example is the eight-page letter from Wurster to Abs on May 23, 1956, BASF UA, C 21.

the shareholders organized by his bank, he possessed the ability to control things, and his reputation as a banker, his competent advice, and the quality of his service guaranteed BASF that indispensable resource, trust. Above all, his key position in the company's information network enabled him to improve the basis for top management's decisions, in which he frequently had a direct part. Not all members of the supervisory board united so many functions in one person. One way or another, though, most of the members helped perform at least one these responsibilities. Together, the members were able to generate and foster long-term cooperation between BASF and other enterprises, between BASF and its workforce, and between BASF and its owners.

In the long 1950s, the composition of the supervisory board came to show a pattern of substantive consistency and broad representation that went beyond the remarkable continuity of its membership. Because of the company's dependence on research as its cardinal nonmaterial factor of production, BASF always had an outstanding researcher on the supervisory board. Richard Kuhn, the Nobel Prize winner from Heidelberg, was followed in 1968 by the Nobel Prize winner Manfred Eigen (who remained until 1998). Except for only brief interludes, organized shareholder interests were represented on every board in response to owners' calls for more participation and control. Aloys Wihr was succeeded in 1969 by Kurt Hohenemser of the German Association for the Protection of Shareholders. The members of BASF's managing board almost always moved to the supervisory board when they retired. From Carl Wurster's retirement in 1965 until just very recently, the chair of the supervisory board has been occupied by former chairmen of the managing board. They, like other members of the managing board, have put their expertise at the service of BASF beyond their active working lives. In the wake of the company's expansive course in the 1960s, more and more "economic experts with worldwide experience"¹⁰⁷ took seats on the supervisory board, where insight into European currency issues has been provided since 1955, beginning with Hans Karl von Mangoldt-Reiboldt. The same trend has been apparent since 1970 in the appointments of foreign bankers and entrepreneurs such as Alfred Schaefer (Schweizer Bankgesellschaft), who shared his vast knowledge of the Swiss capital market and chemical industry, and Josef Rust (Wintershall AG), who represented the interests of merged companies. The composition of the supervisory board's employee representation, too, has increasingly reflected the diversified internal structure that acquisitions and mergers have bequeathed the BASF Group, as the corporation has been called since 1966.

The tighter and more balanced the relations became between BASF and its shareholders on the supervisory board and at the shareholders' meetings, the more they attracted the criticism of outsiders, to whom the rules of these

¹⁰⁷ Obituary of Hans Karl Mangoldt-Reiboldt, BASF annual report for 1970, p. 3.

interwoven relationships seemed too unclear to submit to. At the meetings from the second half of the 1950s on, these opponents did much to determine the external image evoked by disputes with the person presiding over the assembly and with the managing board, which was obliged to disclose certain kinds of information. They were usually concerned with advancing short-term shareholder interests as opposed to the company's long-term thinking about its operations and resources. They focused primarily on pushing for higher dividends and bettering the conditions attached to capital increases. Under the prevailing power structures and mindsets at the shareholders' meetings, such motions stood little chance of gaining majority support. The attacks by individuals, commonly self-appointed perennial opponents, were therefore aimed initially at what they justifiably saw as the Achilles heel of the German Stock Corporation Act – its meager paragraphs about the managing board's responsibility to provide information to its shareholders and the public. The critics sought wide-ranging information rights that would have recurrently led to a presentation of the tax accounts at the meeting. Most German enterprises, however, lagged far behind what their foreign competition had to disclose as a matter of course if their shares were listed on the New York Stock Exchange.

BASF expressly declared it was not in the avant-garde of the shareholder-rights movement, which had long since permitted shareholders elsewhere to examine the balance sheet at their meeting.¹⁰⁸ Such corporate reporting was practiced, for example, by the Deutsche Bank Group of Hermann Josef Abs himself. When presiding over the shareholders' meeting of BASF in May 1957, he therefore vociferously defended himself against what he felt to be an affront when questioned by a small shareholder named Erich Nold, who became the point man for this new kind of opposition at the meeting. Referring to Section 112 of the German Stock Corporation Act of 1937 (Section 131 in today's act) during the preliminary stage of the capital increase from DM 510 to 612 million, the 28-year-old coal dealer from Darmstadt demanded a detailed account of BASF's "true" profitability. In relation to the annual turnover of DM 1.5 billion, the declared net margin of DM 51 million seemed too low to him, so he requested details that would have been tantamount to presenting a tax statement. The managing board and Abs refused to release such information on the grounds that they had to protect the interests of the company. When Nold, who represented DM 20,000 in shares of his own, then brought a motion to break off the meeting and adjourn it, Abs, to the applause of those present, ruled him out of order and pointedly turned off Nold's microphone.

Although Carl Wurster felt it unreasonable to have to present a virtual tax statement to Nold, and although Nold's demand was not explicitly

¹⁰⁸ Rechtsabteilung, Protokoll der Hauptversammlung vom 1. Juli 1955, 10.30 Uhr im Pfalzbau; BASF UA, C 21.

supported by law, it was still doubtful whether Abs had the right to curtail the shareholder's right to information so radically by ruling him out of order. Evidently, Abs did not fear that Nold would be able to hold him to "the principles of conscientious and faithful accounting" (Section 112) through the courts, although the law categorically provided for this possibility and left the decision "solely" to the district court (*Landgericht*). Actions to set aside resolutions of the shareholders' meeting had hitherto always failed before coming to court because of the financial risk borne by the plaintiff. This risk depended on the value in controversy, that is, on "society's interest in sustaining the contested resolution." In this case, the amount could have risen to DM 102 million, so the first instance alone would have cost approximately DM 2 million in docket and lawyers' fees. Although the parties finally agreed on a value of DM 50 million,¹⁰⁹ the security for court costs alone came to DM 600,000. This sum was beyond the young employee's resources, but he still wanted to know "whether due process permitted the power of the directors of big enterprises to be so dominating that the normal citizen cannot ever use the means of defense granted by lawmakers."¹¹⁰ He therefore petitioned the Frankenthal district court, which had jurisdiction, for leave to sue in forma pauperis.

The Frankenthal Chamber for Commercial Issues granted the petition within just three days and had Nold's charge brought against BASF. Because legal aid could not be granted unless the chamber considered the lawsuit promising, the action marked the first time in the history of the German Stock Corporation Act that a small shareholder was in a position to have an independent court ruling on a resolution adopted at a shareholders' meeting. To avert such a precedent and avoid jeopardizing the capital increase, BASF negotiated with Nold out of court, agreeing on June 19 to a settlement. The arrangement eliminated the danger of years of litigation and an uncertain outcome but also came to have significant impact on the style and scope of the information that shareholders are supposed to have at their meetings. BASF promised "to go through [Nold's questions] again with the plaintiff" and answer them in a legal context.¹¹¹ In return, it was agreed that the plaintiff "immediately withdraw the act to set aside filed at the Chamber for Commercial Issues of the Frankenthal district court before it is served." BASF paid the costs of the settlement, which for Nold had come to DM 168,671.40.

The settlement did not strengthen the shareholders' right to information, but it did reinforce their right to "conscientious and faithful account" of all

¹⁰⁹ BASF managing board to the members of the supervisory board, September 19, 1957; BASF RA.

¹¹⁰ Nold's petition to the Frankenthal district court for leave to sue in forma pauperis, see *Der Spiegel*, August 14, 1957, p. 31.

¹¹¹ Settlement between the BASF shareholder Mr. Nold and BASF, June 19, 1957; BASF RA.

matters not covered by the mandated catalogue of information refusal set forth in Section 112 of the act in force then. Above all, it seemed to be a signal to break with Abs's inveterate habit of fobbing off shareholders with laconic or even pedantic, overbearing answers at the meetings. After the one of July 15, 1954, the first that shareholders could attend, the managing board sensed the need to go back and respond to the questions raised by the Association for the Protection of Small Shareholders but "insufficiently addressed as a result of the chairman's summary proceedings."¹¹² Shareholders' meetings, which up to 1957 had lasted scarcely longer than two hours, thereafter dragged on and on in marathon debate. The extraordinary meeting held in the main hall of the Feierabendhaus (BASF's employee clubhouse) on September 25, 1959, was attended by 2,000 shareholders, who argued for seven hours about the above-par issue price for new BASF shares. Be that as it may, the level of debate perceptibly improved. As journalists unanimously agreed, this outcome owed itself as much to fair proceedings as to the aspiration of the opponents to make a positive contribution."¹¹³

After these episodes, BASF prepared for the shareholders' meetings meticulously. The legal affairs department anticipated the likely question-and-answer game and wrote up possible sequences of questions, drawing on experience with the debates at the meetings of IG Farben's two other successor companies, whose camps of shareholders were, of course, shaped by the same protagonists as in Ludwigshafen.¹¹⁴ For a year and a half following the Nold affair, the managing board itself looked after shareholder issues as a top priority. It responded to individual initiatives by representatives of organized shareholder interests, who sallied forth with ever greater frequency, especially from the Association for the Protection of Small Shareholders. They came outside the shareholders' meetings, too, bearing resolutions for the managing board, offering to discuss things, and presenting written statements. Not until December 1958 did the corporate management begin to think about "how the managing board can in future be relieved of those details of shareholder relations in which the strain on the managing board is disproportionate to the importance of the matter."¹¹⁵ It was decided to have a staff within the legal affairs department deal with such correspondence on its own. As a precaution, however, Wurster and Heintzeler would initially supervise the process somewhat.

Although the legal position of the shareholders did not change until the German Stock Corporation Act was amended in 1966, they now had leverage

¹¹² Minutes of the managing board meeting of July 19, 1954; BASF RA.

¹¹³ "Aktiendemokratie," *Frankfurter Neue Presse*, September 29, 1959. Similar appraisals appeared in *Börsenzeitung* (Frankfurt am Main) and *Handelsblatt* (Dusseldorf).

¹¹⁴ As with the preparation for the 1958 shareholders' meeting, documents of May 30, 1958; BASF UA, C 21.

¹¹⁵ Minutes of the managing board meeting of December 17, 1958; BASF RA.

that ensured them of more attention from company management than they used to receive. The occasionally turbulent events at the meetings also gradually changed the behavior of both camps. The shareholders availed themselves of their voting rights with ever greater deliberation, and the managing boards pursued a more and more open information policy. In this regard, too, BASF's extraordinary shareholders' meeting of September 1959 set an example. Shareholders representing DM 12 million of the DM 150 million over which Deutsche Bank exercised proxy rights (which Nold derided as "means of economic dictatorship") obliged the bank to vote "no" for their shares when the conditions of emission at a premium came up for decision.¹¹⁶

Indeed, all three successor companies of IG Farben reached out to their shareholders by making an effort to present the balance sheets more truthfully and clearly than in the past. According to the financial press, "corporate reporting and the advancement of shareholding as a whole are tremendously indebted to them."¹¹⁷ By the mid-1960s, all three companies were announcing their profit both before and after taxes. Going further, BASF broke down the tax items even more and thereby allowed the shareholders a deeper analytical look into the earnings statement. By showing the cash flow (annual surplus, depreciation, and allocations to long-term reserves), the company handed them formulae with which to judge their capital investment for themselves and thereby hoped that the open-book policy would translate into a competitive edge over others on the capital market.

This positive development probably derived less from pressure exerted by small shareholders than from BASF's growing orientation to foreign capital markets, which had higher standards of corporate reporting than Germany did. BASF shares were listed on the Paris stock exchange in late 1959 and on the three Swiss stock exchanges – Zurich, Basel, and Geneva – in early 1960. In July 1960, however, the managing board did not bring BASF shares into the London trading center, despite the urging of the Warburg banking house. The board decided "that in view of the situation on the stock exchange, it is less advisable than ever to encourage an initiative to bring BASF shares onto additional foreign stock exchanges."¹¹⁸ Nevertheless, the pull toward greater disclosure could not be stopped. Before his final shareholders' meeting as chairman of the managing board in May 1965, Carl Wurster expressed his subjective impression, stating: "We are now in fact sitting in a glass box."¹¹⁹ Kurt Fiebig (the speaker of the Association for the Protection of Small Shareholders), Nold, and others representing the interests of small shareholders certainly would not have agreed with him, especially since the

¹¹⁶ Roland Müller, "Die Front der Kleinaktionäre wächst," *Frankfurter Rundschau*, September 29, 1959.

¹¹⁷ "Formeln für Aktionäre," *Frankfurter Allgemeine Zeitung*, April 20, 1965.

¹¹⁸ Minutes of the managing board meeting of July 4, 1960; BASF RA.

¹¹⁹ "Badische Anilin deckt ihre Karten auf," *Die Welt* (Hamburg), April 17, 1965.

coal dealer had filed another liability claim in 1965, this time protesting Abs's advice during Deutsche Bank's shareholders' meeting that he, Nold, ought "to seek legal and medical counsel."¹²⁰ At the same juncture, Wurster, too, retreated on the openness of his accounting by turning vehemently against the New York practice of publishing quarterly profits. When it came to corporate financial reporting, the time had not yet come to submit to the short-term rhythms of the stock exchange.

By 1964, at the end of the long 1950s, the shareholder structure of BASF was not dramatically different from what it had been in 1953 and 1954. Although the number of shareholders had nearly doubled from 121,000 to 226,000 and although BASF's share capital had gone up even more, from DM 340 million to 800 million, there had been little change in the proportions of nominal capital held by individual social groups.¹²¹ Even more telling was the fact that share capital had not become significantly more concentrated than in the past. There was still no one who could even remotely be regarded as a "principal shareholder." More than half the shareholders each owned less than DM 1,000 of nominal share capital, and only 25 shareholders owned shares with a nominal value of DM 1 million. In mid-1968 Allianz, which owned a block of shares with a nominal value of DM 25 million representing 2.1 percent of BASF's share capital, was considered "probably the biggest BASF shareholder."¹²² All told, this "millionaire's group" made up only 8 percent of the share capital in 1964 – not an eminent stakeholder position.

Partnership and Conflict: Industrial Relations

Toward the end of the long 1950s, after a decade of labor-management relations at BASF, both sides were critical of the results. The reason, paradoxically enough, was that both "partners" had achieved their main aims. Jobs were secure, working hours had been cut from 48 to 44 (42.5 for shift-workers), the pay of the employees had more than doubled in real terms since the refounding of the company, real wages and salaries in most income categories were clearly higher than the index figures of the chemical industry, and the workforce enjoyed extra fringe benefits far beyond the standard in that sector.¹²³ BASF had not experienced industrial strife since its refounding and profited from a skilled core workforce whose members, seeing themselves as

¹²⁰ Minutes of the managing board meeting of October 11, 1965; BASF RA.

¹²¹ BASF, "Ergebnisse einer Erhebung über die Streuung der BASF-Aktien im Spätjahr 1964"; BASF RA.

¹²² Minutes of the managing board meeting of May 13, 1968; BASF RA.

¹²³ "Einstufung und Verdienste der Lohnempfänger und Tarifangestellten (Vergleich: Chemische Industrie – BASF)" [Classification and pay of wage and standard salary earners (comparison between the chemical industry and BASF)], Personal und Soziales, statistisches Büro, July 16, 1965, attachment 10a to 22/65; BASF RA.

“Anilines,” increasingly identified with the company. The managing board of BASF was therefore all the more nonplussed when labor militancy over wage policy began to mount in October 1963. Its members were somewhat bewildered as they analyzed the possible reasons why, of all industrial organizations, IG Chemie-Papier-Keramik – the union for people employed in the chemicals, paper, and ceramics sectors – had become the most radical one.¹²⁴

Part of the answer did not lie far afield. At about the same time, the alarm bells also went off in the administrative office of IG Chemie in Ludwigshafen because ever more workers were turning their backs on it, and the rest had evidently become “tired of organizations,” jeopardizing their union’s capacity to fight.¹²⁵ This development was not a special local phenomenon but rather a trend in the West German labor movement, which in 1955 had irrevocably abandoned basic demands for a new social order and economic structural reforms and had opted instead to concentrate pragmatically on wage and sociopolitical goals. The only lingering reminder of the reforms aspired to in the postwar program was the call for wider adoption of employees’ rights to have an equal voice in management decision making. The new focus consisted entirely of aims that were relatively easy to achieve on the wave of high growth rates and rapidly rising national income: reduction of working hours, raises of wages and salaries, expansion of the social safety net, and improved occupational safety and health. But after seven years of plenty, the seemingly automatic successes with collective bargaining put the whole purpose of union organization in question. It risked losing its traditional character of a struggle and a movement; it was in danger of becoming dispensable in the eyes of its members.¹²⁶

At BASF this trend was intensified by the fact that a large portion of the wages and salaries was negotiated with the works council as a company pay raise over and above the various collective-bargaining agreements that had already been reached at the district level. In April 1965 the resulting wage and salary drift amounted to more than 43 percent of the collectively agreed basic pay among the manual laborers and 13 percent among office staff.¹²⁷ However, this procedure in collective bargaining primarily strengthened not the union but the works council and its long-time chairman, Ernst Lorenz, who rose to become the undisputed “king of the Anilines” by the time he left in 1962. Granted, ever since the first elections for the works council, all its members – in keeping with the Labor-Management Relations Act of

¹²⁴ Karl Saftien, the managing board member in charge of personnel and social affairs, at the managing board meeting of October 7, 1963; BASF RA.

¹²⁵ Braun, *SchichtWechsel*, p. 136. ¹²⁶ Schönhoven, *Gewerkschaften*, pp. 226–7.

¹²⁷ Übersicht des Lohn- und Gehaltsaufbaus [General view of the wage and salary structure], Personal und Soziales, statistisches Büro, July 16, 1965, attachment 10b to 22/65; BASF RA.

1952 – had simultaneously been members of a union (5 from the German Union of White-Collar Employees [DAG] and 30 from IG Chemie). But these works councils were committed to the good of the factory, and that in more ways than just the letter of the law. If push came to shove, their loyalty lay with their own workforce and only secondarily with overriding objectives of union policy.

That stance seemed to pay off for them. Since 1950, real wages had risen by an annual average of more than 5 percent. By 1960, growth of the payroll nevertheless lagged behind the growth of the company's sales, which had risen by 34 percent since 1958 as opposed to only 30 percent for wages and salaries.¹²⁸ This constellation, which was comfortable for both sides, did not change until 1961, when IG Chemie took this gap as cause to pursue a more active wage policy in order to remind its members of its existence. Within three years (1960–2) it won wage hikes of nearly 40 percent, quickly acquiring the reputation of being a radical union. Consequently, the payroll rose by 18 percent in 1961 for the second year in a row, whereas BASF's sales fell by 4 percent the same year.¹²⁹

The extensive gains by the unions in wage policy were possible only with the tension on the labor market. On the managing board, Karl Saftien, the head of personnel and social affairs, pointed out BASF's dilemma. On the one hand, the domestic labor market was exhausted and had few areas with reserve labor even if production were moved out of Ludwigshafen. On the other hand, it was necessary to plan in a timely manner for the use of foreign labor to replace personnel leaving the company, not to mention for investments to diminish the payroll through modernization and efficiency.¹³⁰ The employment of Italian and Croatian "guest workers" had already begun in 1960 – chiefly in BASF's construction companies – and there had already been thoughts about expanding "the labor-market area of the factory by means of a rather generous development of the road system in the Palatinate."¹³¹ But the preliminary planning was only just commencing for the construction of barracks to house a large number of foreigners, a costly project bound to cause trouble because of the siting issue. Each year 4,600 employees, or 10 percent of the company's entire workforce, had to be replaced just to maintain the number of people working in the production areas and ancillary plants.¹³²

The hopes for the labor market turned more and more to foreign countries. The flow of guest workers coming to BASF, which began in 1960 with 920 people, mostly Italians, had not yet swelled much by 1962. During that year, though, the number of workers from abroad climbed to 1,409 and tentatively

¹²⁸ BASF annual report for 1961, p. 26. ¹²⁹ Ibid.

¹³⁰ Minutes of the managing board meeting of June 18, 1962; BASF RA.

¹³¹ Minutes of the managing board meeting of December 21, 1959; BASF RA.

¹³² Minutes of the managing board meeting of June 18, 1962; BASF RA.

peaked in 1974 at 5,239, or just under 10 percent of BASF's total workforce (but more than 20 percent of those on rotating shifts), before shrinking again in the shadow of the oil crisis.¹³³ In the early 1960s, however, staffing at BASF during vacation periods hung by the thread of more than 1,500 students, volunteers, and interns who guaranteed the company at least a seasonal "reserve army" year after year.

Industrial conflicts over union demands were therefore unnecessary. They were not to become a factor in wage disputes until the 1970s. Still, the eight-week strike that IG Chemie led in the paper industry of several West German states in 1962 hit like summer lightning among employers in the chemical industry, who carefully noted it. The climate of collective bargaining gradually cooled, leading the managing board to consider as a precaution "whether BASF has to plan in more emergency measures than in the past in case of a strike."¹³⁴

IG Chemie's escalating belligerence over pay policy had another root as well. From the mid-1950s to 1963, union membership at the Ludwigshafen chemical plants had declined from just under 68 percent of the total chemical workforce to 48.4 percent, and it was not much higher at BASF. As though this erosion of influence did not already worry the union enough, the dramatic white-collar development lurking behind these numbers really alarmed it. With Herculean effort, it had been possible to stabilize blue-collar membership at 55 percent, but white-collar membership plummeted from 29.5 percent in 1960 to 22.5 percent in 1962.¹³⁵ Given the expected continuation of the shift from wage earners to salary earners in BASF's workforce, the union faced an existential threat. From 1952 to 1965 the ratio of blue-collar to white-collar employees within the workforce dropped from 3:1 to 2:1.

The early 1960s thus ushered in not only a harder line on pay policy but also intense effort to build union membership and the quality of union organization in the company alongside and along with the works council. Although BASF had had union shop stewards again since 1945, they had thus far been dwarfed by the works councils. IG Chemie had repeatedly charged that the works councils in many plants were influenced more by the company management than by the union, but the initiatives formulated by the union in late 1959¹³⁶ did not gather sufficient support in Ludwigshafen until after a generational change in labor representation at BASF. In 1964 the strengthened body of shop stewards at BASF elected the very first

¹³³ BASF annual report for 1961, p. 33; BASF annual report for 1962, p. 34; and Ressort P to the members of the managing board, "betr. Ausländer-Probleme," September 5, 1975, attachment 8 to 27/75; BASF RA.

¹³⁴ Minutes of the managing board meeting of October 7, 1963; BASF RA.

¹³⁵ Braun, *Schicht Wechsel*, p. 136.

¹³⁶ "Mehr Sorge um den Betrieb," Initiative program of IG Chemicals, Paper, and Ceramics, *Gewerkschaftspost IG Chemie-Papier-Keramik* (Hanover), 10, no. 24 (December 1959).

“advocacy groups” (later known as shop steward advisory groups), including one responsible mostly for job-related discussion of the problems confronting salary earners. These modest beginnings gave rise to a dense network comprising “opinion leaders of the organization,” a web that embraced 2,072 volunteer union functionaries by 1987.¹³⁷

The revitalization of the shop steward system raised the union’s profile in the company and put rank-and-file pressure on the works council’s traditional plant policy. However, it also gave the works council new potential for leverage that undoubtedly enhanced the managing board’s willingness to cooperate with the chairman of the works council in isolated cases.¹³⁸ At any rate, the new dual structure of labor representation in the company paved the road to a more active collective-bargaining policy that no longer precluded strikes in the 1970s. Moreover, it pointed the way to grass-roots action that sometimes turned radical under the political conditions of the late 1960s, transforming IG Chemie into a professed “left-wing union.”¹³⁹

These changes, however, came nowhere near putting strikes on the agenda of industrial relations at BASF. One must go back to the period before the refounding of BASF to find walkouts as an instrument in labor disputes, and those instances were aimed at the occupation powers, not at the company management. One of them was the 1948 warning strike against Carl Wurster’s indictment at the Nuremberg Tribunal. Others were the work stoppages and demonstration strikes in protest against the dismantling program. This history of common cause between labor and management were important pillars of the cooperation between organized labor and management, the “social partnership,” of the long 1950s.

BASF responded to the new situation flexibly at first. The company went along with the demands that the works council raised in 1969 in order to hold the field against the “Maoist and communist groups” vying for the trust of the workforce. From BASF’s perspective, the regional chairman of IG Chemie, Hans Schweitzer, had “made new demands even of top management so as to take the wind out of the sails of calls for wildcat strikes.” The managing board authorized its member for personnel issues, Hans Moell, to abolish, as requested, the *Bemessungslohn*, or the practice of reducing collectively negotiated raises in wages and salaries by subtracting from them some of the company’s voluntarily paid fringe benefits. The board also approved an analogous allowance for salary earners.¹⁴⁰ Quick action was intended

¹³⁷ Braun, *SchichtWechsel*, pp. 141–3.

¹³⁸ An example was the negotiations on the annual bonus. See the minutes of the managing board meeting of November 8, 1971; BASF RA.

¹³⁹ Gewerkschaftstag IG Chemie, Papier, and Keramik, “Weder Revoluzzer noch Konformisten,” *Die Quelle*, 14 (1963), 473–4, and “Mitbestimmung auch durch Streik.” Karl Hauenschild, “IG Chemie bleibt linke Gewerkschaft,” *Gewerkschaftspost IG Chemie-Papier-Keramik* (Hanover), 20, no. 10 (October 1969), p. 5.

¹⁴⁰ Minutes of the managing board meeting of September 13, 1969; BASF RA.

“to protect [the company] better from further demands and complications,” although it meant around DM 32 million in additional outlays.¹⁴¹

As mutually satisfactory as this interaction was for the responsible figures of the two sides, it could not go on for long. The union, under pressure from its radicalizing membership, temporized in order to take advantage of the winning situation of the late 1960s and wanted to take another good “swig from the bottle” in the early 1970s. On the grounds of “social symmetry,” it had publicly called on the incumbent Minister of Economics, Karl Schiller, to do just that at the end of the 1960s, but the move no longer fit the policy of stabilization integral to his (Schiller’s) policy of state organized cooperation of labor and management.¹⁴² All the same, the pay negotiations of 1970 elevated collectively agreed wages and salaries by about 11 percent and brought about small improvements in the wage classification for young people and in asset-creating benefits. (With asset-creating benefits, the parties to a collective agreement could, if desired, formally determine a sum that the employee was obliged to place in long-term savings or securities. The state then paid an additional bonus based on these wage elements.) Together with the statutory, collective, and operational wage commitments, these outlays drove up wages and salaries at BASF by 26 percent, from DM 900 million to 1.134 billion.¹⁴³ This result hit especially hard because it came just as the economy began a downturn, but the fight over pay policy became even rougher. Seeking at least an 8 percent raise in wages and salaries, IG Chemie declared that it was prepared to call for a strike¹⁴⁴ in order to underscore its willingness to use limited work stoppages as a collective-bargaining tactic even before a strike ballot.

It was no secret that the chemical industry had unexpectedly hit an economic slump that forced painful cutbacks in its ambitious investment programs. To salvage what was economically possible from the situation, the negotiators in the collective-bargaining area consisting of the Rhineland, the Palatinate, and the Saar quickly concluded an agreement that boosted real wages and salaries by 6.5 percent. Admittedly, the limited strikes in North Rhine-Westphalia and Hesse won raises 0.6 percentage points higher, but the labor representatives from the Rhineland, the Palatinate, and the Saar agreed to the decision of their arbitration board only after BASF had promised “not to reduce the annual bonus without compelling reasons and only after discussion with the works council.”¹⁴⁵

¹⁴¹ Ibid. Minutes of the managing board meeting of September 26, 1969; BASF RA.

¹⁴² Schiller, *Arbeitnehmer*, pp. 70–1.

¹⁴³ “Tariferhöhung und Personalaufwand der BASF AG,” attachment 9 to 24/70, May 21, 1970; BASF RA.

¹⁴⁴ “Arbeitgeber-Provokationen lösten einen harten Arbeitskampf aus. Zehntausende im Streik,” *Gewerkschaftspost IG Chemie-Papier-Keramik*, 22, no. 7 (July 1971), p. 1.

¹⁴⁵ Minutes of the managing board meeting of November 8, 1971; BASF RA.

Within two years the winds of the business cycle had shifted again. High profits in the big companies of the chemical industry prompted union demands for 12 percent more pay, which were emphasized in April 1973 with demonstrations, protest marches, and even “spontaneous” warning strikes on BASF factory premises. Management and labor rapidly agreed on a relatively high pay hike of 9.9 percent. However, 70 percent of IG Chemie’s shop stewards and many BASF employees seriously disapproved of the result. Warning strikes broke out again, and columns of protesters set out marching south on the traditional route from Oppau, chanting “Twelve percent’s what we desire – ‘til Timm’s lab coat catches fire! Bernhard, we’re coming.”¹⁴⁶ The protests forced management and labor into federal arbitration, which finally led to raises of 10.2 percent (and a single payment of DM 60).

Paradoxically, this dubious result for stability policy defied the will of the executive board of the DGB (German Trade Union Federation) and the regional management of IG Chemie. They had both urged an agreement that would promote stability but had found themselves “cornered by the BASF works council into having to show the rank and file a success in order to avoid wildcat strikes, etc.” By contrast, BASF’s managing board facilitated the higher settlement by authorizing its negotiators, Friedrich Dribbusch (the managing board member responsible for Personnel) and Hans-Albrecht Bischoff (the head of the Social Policy Department), to make a special BASF contribution of DM 3.5 million above and beyond the 9.9 percent offered by the employers’ organization in the chemical industry.¹⁴⁷ Although the collective agreement far exceeded the federal government’s informal wage guideline, union shop stewards at BASF still disapproved. Ultimately, however, they accepted in the knowledge that it created new standards for collective wage disputes. As summarized by one of the strategists of the wage and salary movement: “For the first time, the employees of a giant West German chemical company proved that they are determined to fight for their interests to the last. For the first time it became clear how vulnerable such a major chemical plant is when things get serious.”¹⁴⁸

In reality, the unions had already reached – and had soon overstepped – the outer limits of their clout in collective bargaining. The era of the “economic miracle,” with its two-digit growth rates, had ended forever in Ludwigshafen. And in the workforce’s collective bargaining, economic success within Germany’s chemical industry was no longer linked to the personnel expansion, increased social benefits, and dynamics of pay policy that had tripled real wages from 1950 to 1971. The subsequent years were marked instead by emphasis on investments to streamline processes and cut personnel,

¹⁴⁶ Braun, *SchichtWechsel*, p. 148.

¹⁴⁷ Minutes of the managing board meeting of September 26, 1969; BASF RA.

¹⁴⁸ Heinz Esslinger, “BASF-Kollegen probten den Aufstand,” *gp – Gewerkschaftspost IG Chemie-Papier-Keramik* (Hanover), 24, no. 6 (June 1973), p. 1.

moves that perceptibly lessened the company's dependence on the overall labor market.

The company management also adapted better and better to the new forms of confrontation with labor and, just in case, prepared for strikes in a variety of ways. BASF's managing board was therefore ready when its offer of 6 percent was answered in May 1977 by a strike ballot called by IG Chemie in Rheinland-Palatinate, which was under pressure from the BASF workforce to "secure the employees here a greater share of the social wealth they had created."¹⁴⁹ The outcome of the exercise was as impressive as it was ineffectual, with 92.1 percent of the union members in BASF participating and 83.4 percent voting to strike. Unswayed by the bellicosity, the company took precautionary measures to continue operations, if necessary, with strikebreakers and with storage facilities housing BASF products outside the factory premises. In the end the industrial partners settled on a pay raise of 7 percent (with a retroactive payment of DM 165 for April), an arrangement more generous than those concluded in other chemical plants but by no means one that justified the dear cost. The second strike ballot turned out correspondingly weak. With 62 percent of the union members participating, 64.4 percent voted for the collective agreement and 34.3 percent against.

The results of the 1977 wage and salary negotiations were thus disappointing for the workforce and created rifts that sharply divided groups of very different ideological and tactical viewpoints within IG Chemie. The radical Marxist wing known as the "Maxdorf Group" (*Maxdorfer Kreis*, named after the site between Ludwigshafen and Bad Dürkheim where it had been formed) managed to exploit the frustration of union members at BASF and elsewhere. The group challenged established representatives of labor and raised the issue of power within the company. In the 1977 elections to BASF's supervisory board, the first to be held under the amended Labor-Management Relations Act of 1976, the representative of the Maxdorf Group, the Communist Otto Zimpelmann, narrowly lost to the Social Democrat Roland Koch. In the new elections to the works council, the representative of the wage earners, Kurt Hermann, another exponent of the radical wing, won against Rudi Bauer, the incumbent chairman of the works council and the representative of the salary earners. But at the Mannheim union conference of IG Chemie in 1980, a decision began to emerge in this ideological struggle, which had pitted the supporters of cooperation between labor and management against advocates of radical opposition to the powers that be. The camp espousing class struggle, whose representatives included the chairman of BASF's works council, Kurt Hermann, received only about 40 percent of the votes, and the union returned to a resolute course of industrial policy based on social partnership. After Hermann Rappe succeeded

¹⁴⁹ Braun, *SchichtWechsel*, p. 149.

Karl Hauenschild as head of IG Chemie, the sector's old virtues of cooperation in collective bargaining and joint, future-oriented industrial policy entered the final stage of their re-ascendance, shaping the union's declared objectives at the national level and on the shop floor.

Costs and Benefits: Plant Policy with a Social Bent

In the mid-1960s, at the same time that the union was assessing the economic value of BASF's social policy of the previous 14 years, BASF's managing board was conducting its own thorough cost-benefit analysis. The board was persuaded that "economic development" was forcing the company to work toward "a better balance between total personnel costs and fringe benefits and overall output."¹⁵⁰ A re-evaluation seemed warranted not so much by business cycles and profitability, which progressed marvelously in the 1960s with only brief interruptions, but rather by the course of wages and salaries. The idea was to bolster BASF's competitive position within the sector.

An analysis of the DM 774.1 million in personnel costs and fringe benefits in 1964 gave "cause for concern," for nonwage labor costs came to 43.7 percent of the total. For this calculation the statistics office had adjusted the wage and salary amount for all "fringe" components not directly related to work output. In other words, the payroll was reduced to the standard wages and salaries, including all agreed bonuses and allowances. "Nonwage labor costs" accounted for the remainder. The alarming result was the probably justified conjecture that this percentage "is unlikely to be matched by any other competitor." Comparison between BASF and Vereinigte Glanzstoff-Fabriken AG (VGF), a major client and a friendly manufacturer of textile fibers, clearly showed that nonwage labor costs at VGF amounted to only 28.2 percent of that company's personnel costs and fringe benefits. The discrepancy became even more glaring if one compared only the extra benefits voluntarily paid by the two companies, that is, benefits not including social security contributions and other statutory and collectively agreed fringe benefits. This category accounted for 13.5 percent of VGF's personnel costs and fringe benefits, only half the share that BASF granted for financing retirement, business operations (ranging from work clothing to occupational training), health and social care, and miscellaneous expenses and disbursements.¹⁵¹

This disparity between the amount of BASF's social expenditures and that of other companies had two main sources. The first was the level of voluntary contributions to the retirement of members of the company workforce.

¹⁵⁰ Minutes of the managing board meeting of June 26, 1965; BASF RA.

¹⁵¹ "Personal- und Sozialkosten 1964" [Personnel and social costs for 1964], Personal und Soziales, statistisches Büro, April 28, 1965, attachment 10c to 22/65; BASF RA.

The second was an annual bonus consisting of DM 3 to DM 8 per year of service in the company and a performance-based payment. Until 1964, the percentage that the annual bonus represented in the recipient's gross income as a rule closely matched the year's dividend rate. When it came to measures for cutting nonwage labor costs, the annual bonus was thus high on the list.

The annual bonus, which along with the 1964 anniversary bonus came to a combined total of DM 81 million in 1964, or a good 10 percent of the personnel costs and fringe benefits, was originally supposed to follow the downward trend in earnings.¹⁵² In practice, however, it was pegged to the dividend rate, the level of which was oriented not only to profitability but also – and primarily – to the competitive conditions of the capital market instead. In collective bargaining policy, on the other hand, the annual bonus served behind the scenes as a bargaining chip intended to maximize BASF's weight in pay negotiations at the regional level. This function was obvious in the wage and salary negotiations of 1971, when BASF consented to diminish its annual bonus only in agreement with the works council. The concession went a long way toward moderating demands and spared the Palatinate the wave of strikes that hit the other states in Germany. In return, the managing board finally declared its willingness to refrain from raising demands so as to avoid supplying the radical groups in the works council new grist for agitation.

Over Heintzeler's dissent, the sum of DM 112 million disbursed the previous the year was paid out again. He considered it "preposterous" to announce publicly that pre-tax profit in the third quarter had dropped to nearly half that of the second quarter but that the annual bonus (approximately 150 percent of a month's income) would be unchanged.¹⁵³ Magener indicated the risk "that an annual premium this sizable would, in the eyes of the government and the central bank, discredit the business community's complaints about the general development of wages and salaries and could be cited to prove the necessity of the current economic and currency policies."¹⁵⁴ He pointed out, though, that no liquidity problems would ensue, for the annual bonus had already been anticipated in its entirety.

The decision to compromise was made because the BASF managing board ultimately agreed with the chairman of the works council, Jakob Müller, that "a retrenchment... [would] destroy the policy of reason."¹⁵⁵ The compromise made sense materially, too. Other collective-bargaining areas were burdened with significantly higher settlements and additionally had to cope with up to DM 40 million in strike costs for which BASF was liable only

¹⁵² Minutes of the managing board meeting of August 16, 1954; BASF RA.

¹⁵³ Minutes of the managing board meeting of November 2, 1971; BASF RA.

¹⁵⁴ Minutes of the managing board meeting of November 8, 1971; BASF RA.

¹⁵⁵ Jakob Müller to the BASF managing board, November 4, 1971, attachment 1 to 39/71; BASF RA.

within the limits of previous agreements. Moreover, no lump sums had been paid during the two idle months of the strike. The discussion turned to fundamentals and ended with a vote, a very rare action. With one abstention, the managing board finally passed Timm's motion. The trade-off between the bonus and the development in collectively negotiated wages and salaries was not always this spectacular, but the annual bonus did serve the company not only as a further incentive for commitment to the company and performance but, to some degree, as a tool in collective bargaining policy as well.

To enhance commitment to the company, BASF always linked bonuses with the possibility of employee stock ownership, which entailed special conditions up to the net amount of the bonus. The necessary BASF shares were provided by Deutsche Bank, which habitually had a relatively high inventory of them in its portfolio. They came either from the bank's own holdings or, later, also from assets left over after the breakup of the trust and from capital increases arranged under the bank's syndicate management. Abs endeavored to bring down the level of these holdings slowly and cautiously through contributions to corporate social services of other major enterprises or through these kinds of offers to members of BASF's workforce. The company reimbursed Deutsche Bank in cash for the "social rebate" as the difference between the officially quoted price on the stock exchange and the subsidized issue price.¹⁵⁶

For original subscribers this difference was considerable only at the beginning of the deal, when the bonuses of 1955 were granted. At that point only DM 180 had to be paid for initial shares with a nominal value of DM 100, whereas the sum was DM 200 for every additional share, a level only slightly less than its going price. The level of the social rebate later settled at 5 percent.¹⁵⁷ In 1955, this offer was accepted by 3,502 members of the workforce (13.3 percent), who acquired shares valued at DM 2.5 million. Only 257 (1.35 percent) of the blue-collar workers, artisans, and foremen who were authorized to subscribe did so.¹⁵⁸ The wage earners spent only 5.5 percent of their exceptional 1955 anniversary bonus on such shares; the salary earners, 32.7 percent, although their bonus was only about 30 percent higher. The engineers became particularly skittish about the new pecuniary investment. Heintzeler, in the 1950s one of the leading advocates of having all income and financial groups participate in the stock market ("people's capitalism"), therefore believed "that it will take a long time in Germany before the bulk of the workers warms to co-ownership through share certificates." He exhorted the company not to do much to drum up enthusiasm

¹⁵⁶ Minutes of the managing board meeting of November 5, 1962; BASF RA.

¹⁵⁷ Minutes of the managing board meeting of November 21, 1966; BASF RA.

¹⁵⁸ Heintzeler, special bonus and share acquisition of 1955; minutes of the managing board meeting of October 3, 1955; both in BASF RA.

for it but rather "first to wait and see whether desires in this direction come to us from the workforce at large. Whether we then want to or are able to meet them is another story."¹⁵⁹

To be sure, acceptance of employee stock ownership in 1963 – by then at a market share price of 450 – had weakened. Just under 4,000 members of the workforce, or 8.6 percent of those authorized to subscribe, were persuaded of the merits of co-owning their place of employment.¹⁶⁰ Admittedly, this number well exceeded the previous year's figure. But to Heintzeler and the CDU's business council – his forum for political PR – neither the business community nor welfare-state capitalism in general showed the sign of movement toward people's capitalism that they had sought as the breakthrough to fairer distribution and greater social cohesion.¹⁶¹ By 1968, approximately 25 percent of the BASF workforce was participating in employee stock ownership, and the aggregate nominal value of all such shares issued under special conditions represented about 2 percent of the capital stock. That sum did not quite equal the amount controlled by Allianz AG, probably BASF's principal shareholder at the time.

Like the annual bonus, the additional retirement benefits defied attempts to reduce them to their cost dimension alone. Payments for pensions, company annuities, and the retirement fund, which all came to around DM 24 million,¹⁶² provided for the core workforce, fostered company loyalty and motivation, and prevented costly turnover within the workforce. Ideas for manipulating these items in order to moderate nonwage labor costs had to reflect this connection and take account of possible follow-up costs. The same was even truer for the lion's share of this expenditure category – the reserves for internal pension payments, which came to DM 41.5 million in 1964. The reserves had no direct impact on the security of pension claims, which were possible to finance from current returns if necessary. Such claims included not only BASF's voluntary pension benefits, such as the May bonus and allowances paid to contract pensioners, but also the obligatory allowances for pensions or annuities and contractual pension payments.

The reserves, however, were tax deductible and, through the Salary Earners' Pension Fund (*Pensionskasse der Angestellten*) and Supplementary Pensions GmbH (*Altershilfe GmbH*), could be used for interim financing of real estate or purchases of shares in the interest of the company. In 1954, for example, the pension fund began with the construction of a high-rise for BASF's commercial departments, the later Friedrich Engelhorn Building,

¹⁵⁹ Ibid.

¹⁶⁰ Acquisition of shares by the BASF workforce, Personal und Soziales, statistisches Büro, December 10, 1963, attachment 4 to 33/63; BASF RA.

¹⁶¹ Heintzeler, *Volkskapitalismus*.

¹⁶² "Personal- und Sozialkosten 1964" [Personnel and social costs for 1964], Personal und Soziales, statistisches Büro, April 28, 1965, attachment 10c to 22/65; BASF RA.

which became the landmark of the Ludwigshafen site. The pension fund, set up in 1888 as an employee mutual insurance association, obtained the lease in perpetuity and concluded with BASF a long-term rental contract guaranteeing the company its invested capital along with 6 percent interest.¹⁶³ Supplementary Pensions GmbH also proved itself as a carrier of plant facilities, such as employee baths, company kitchens, and training centers for employees working with chemicals.¹⁶⁴ Operating in one form or another since 1908, this organization had been refounded in late 1952 as a company pension fund with DM 20,000 share capital (75 percent from BASF and 25 percent from the Steeden Kalkwerke [Limeworks] GmbH). Under the regulations on tax-exempt provident funds, it was the successor to IG Farben's assistance fund for blue- and white-collar workers, the *Gefolgschaftshilfe*.¹⁶⁵

With the active support of Hermann Josef Abs, supplementary retirement funds regularly took on participations that BASF considered advisable for reasons of acquisition policy or sectorial policy. One of the first moves of this sort was the participation in purchasing from Thyssen a block of shares in the Gelsenkirchen Mining Corporation so that they would not fall into foreign hands.¹⁶⁶ Thereafter, annual payments of DM 30 to 35 million for pensions and supplementary retirement funds were the rule "if the liquidity situation permitted." By 1960, the reserves of supplementary retirement funds that had built up came to more than DM 100 million in share investments and made possible a tax-free market profit of DM 42 million. BASF wanted and indeed had to mobilize these liquid reserves "for the major financing ahead of us," especially since there was no tax disadvantage "if the supplementary retirement fund gives BASF loans drawing on the proceeds from selling shares" or "executes building projects on its own in the interest of BASF."¹⁶⁷ BASF tapped the liquid reserves of its subsidiary for the first time in late 1960 after Deutsche Bank had cashed in DM 30 million worth of World Bank bonds from the supplementary retirement funds.¹⁶⁸

A less serious class of BASF's nonwage labor costs consisted of the expenditures for things that the workforce and the public closely associated with socially oriented plant policy, such as rooming houses, occupational training facilities, health services, factory social services (including the Dr. Heinrich von Brunck Memorial Foundation), and cultural facilities ranging from the factory library to the factory clubs. For practical purposes this type of outlay did not subsume housing, which had an importance all its own in the 1950s

¹⁶³ Minutes of the managing board meeting of April 28, 1954; BASF RA.

¹⁶⁴ Minutes of the managing board meeting of June 21, 1954; BASF RA.

¹⁶⁵ *Geschichte der Rechtsabteilung der BASF. Von der Gründung bis 1967*, Part V (March 28, 1953, through December 31, 1958), p. 50; BASF UA, B 101.

¹⁶⁶ Minutes of the managing board meetings of November 21, 1954, and December 20, 1954; BASF RA.

¹⁶⁷ Minutes of the managing board meeting of May 16, 1960; BASF RA.

¹⁶⁸ Minutes of the managing board meeting of November 21, 1960; BASF RA.

and 1960s. In 1953, though, the company had more than 2,066 factory apartments, more than 1,880 other dwellings, and 1,632 estate houses of the BASF Nonprofit Housing Society GmbH (Gewoge).¹⁶⁹

The housing issue became acute in mid-1954, when the hiring of 1,000 people highlighted the squeeze on home building. The personnel and social affairs department saw itself unable to meet the need for personnel "without timely completion of the housing construction program." Besides, the great tax reform of 1955 made it seem advisable to intensify the program.¹⁷⁰ By 1956, Gewoge had provided a total of 2,311 housing units at a cost of DM 61.1 million, of which DM 24.5 million came directly or indirectly from BASF by means of special depreciations as defined by Section 7c of Germany's income tax law and through Gewoge's capital stock. Equally to the point, this area of investment was found worthwhile for the pension and supplementary retirement funds as well.¹⁷¹ In the divestment of IG Farben, Gewoge had been assigned to BASF's sphere of interest and was owned by the Salary Earners' Pension Fund until BASF became the principal shareholder as a result of several capital increases since 1953.

It was thought that the building program of 1954 would essentially meet the pent-up demand that had resulted from the war and the postwar period,¹⁷² but the number of people hired at BASF gained by 3,000 that very year, quickly rendering this belief illusory. Construction of 1,000 further dwellings located mostly on Sternstrasse and Saarlandstrasse was planned for 1957 and 1958. The initiative required only DM 3 million in equity financing, with the balance raised through loans and Section 7c depreciations. Another housing scheme was intended to provide 4,000 to 5,000 dwellings in later years. The managing board reserved the right to give its "express consent" to each building phase. In principle, Timm wanted to give priority to encouraging the construction of owner-occupied dwellings, but he also continued to agree haphazardly that the operationally necessary considerations that had once been crucial should still be taken into account." The managing board's guidelines on rent levels revealed that the housing construction program did not revolve around social objectives. Rents were to be raised enough to prevent factory members with a place in the city from applying for a Gewoge dwelling "just because of the lower rent."¹⁷³ As the housing market gradually liberalized, however, this stance also meant that "other future opportunities which may arise for adjusting the rents were to be exhausted."¹⁷⁴

¹⁶⁹ BASF annual report for 1953, p. 17.

¹⁷⁰ Minutes of the managing board meetings of June 21, 1954, and December 3, 1956, attachment 2 BASF RA.

¹⁷¹ Minutes of the managing board meeting of August 31, 1956; BASF RA.

¹⁷² BASF annual report for 1954, p. 33.

¹⁷³ Minutes of the managing board meeting of December 3, 1956; BASF RA.

¹⁷⁴ Minutes of the managing board meeting of November 5, 1962; BASF RA.

At the end of the 1950s it was clear that the dream of enabling every member of the BASF workforce to have his own home would be hindered by operational considerations for a long time to come. In the summer of 1958, close scrutiny revealed 2,826 housing units were still needed, 116 of them immediately. No end was in sight. The construction of several multi-story apartment blocks in the areas of Saarlandstrasse, Luitpoldstrasse, and Sternstrasse had to be built. By late 1964, the number of factory personnel seeking housing had climbed to 3,216, not counting 807 applications for the purchase of owner-occupied dwellings or building sites.¹⁷⁵ Experience showed that every 100 new hires meant a demand for 40 dwellings, and the latter number was edging up because more and more new personnel were coming from outside areas.

It had meanwhile become routine for the Technical Commission to take the additional housing demand and figure its effects on earnings and liquidity into all BASF investment programs.¹⁷⁶ With construction costs running an average of DM 40,000 per dwelling, half of which BASF raised, and with 40 percent of the new employees in search of housing, a sum of DM 10,000 was conservatively calculated for each additional job opening that was filled. Home building – whether factory dwellings in the narrow sense or *Gewoge* dwellings – therefore tended to represent investment costs, not classical non-wage labor costs. They were not expected to disappear in the foreseeable future, for the private housing market was just as tight, as demonstrated by what was offered by the urban home-building society GAG, in which BASF had a 30 percent stake, or other nonprofit building contractors within the labor-market area in question. Even so, the breakdown of personnel costs and social expenditures in 1964 showed only DM 1.5 million for employee housing, gardens, and the housing administration office.¹⁷⁷ Most of the remaining costs weighed elsewhere on the company's liquidity and earnings. It was not an issue of operational cost-cutting measures as long as the BASF workforce in Ludwigshafen continued to expand. For later major projects, such as the Pfingstweide settlement, BASF finally created *Luwoge* Housing Company GmbH, which did not operate on a nonprofit basis.

The decision in mid-1965 to bring personnel costs and fringe benefits back into line with the company's overall performance did not stem from the pressure of a cyclical decline in earnings. It came instead from a comparison with other enterprises in the sector and was supposed to improve BASF's competitiveness and promote the company's ambitious plans to become number one in the industry.¹⁷⁸ The options for paring back personnel costs and fringe

¹⁷⁵ Sozialabteilung (Social Affairs Department) I and II, "Kurzbericht für das Jahr 1964," Ludwigshafen, June 14, 1965, attachment 4 to 18/65; BASF RA.

¹⁷⁶ *Gewoge*, "Denkschrift über das Wohnungsbauprogramm," August 14, 1958; BASF RA.

¹⁷⁷ "Personal- und Sozialkosten 1964" [Personnel and social costs for 1964], Personal und Soziales, statistisches Büro, April 28, 1965, attachment 10c to 22/65; BASF RA.

¹⁷⁸ See section 5 on this point.

benefits were narrowly limited. Labor law allowed little scope for the managing board's resoluteness "to part with employees whose performance is inadequate."¹⁷⁹ The idea that employees who had reached 60 years of age would be examined to determine whether early retirement was necessary was easier to implement but not necessarily ideal as a cost cutter. Above all, it soon became clear that the level of both the wage drift and the nonwage labor costs had not come about by chance. It was the price paid for the trust and cooperation that marked industrial relations within the company, and it contributed indirectly in many ways to the success of BASF.

Jettisoning even only some of these extra benefits was therefore anything but easy. As far as the wage drift was concerned, BASF opted to narrow the disparities between effective and standard wages and salaries by reducing benefits exceeding the collectively agreed scale. The *Bemessungslohn* that the company introduced led to "great dissatisfaction"¹⁸⁰ in the workforce throughout the BASF Group and became a constant bone of contention between the works council and the management. The managing board was actually relieved when it could abandon it in the pay negotiations of 1969 to oblige the cooperative elements of the works council.

The margin for "adapting" the nonwage labor costs was just as slim. If the building of large reserves for pension obligations had not already been routine in 1965, it would have been necessary to introduce the practice as quickly as possible. It was not until the company's expansionist policy gathered momentum that the money put aside for pensions and supplementary retirement funds could fully play out its role as an instrument for financing acquisitions. The annual bonus seemed to be the only worthwhile target for immediately effective cost-cutting. In 1964 BASF ended the habit of orienting the level of the employees' annual bonus to the year's dividend rate received by the shareholders. These two supernumerary provisions had deliberately and symbolically been kept in step with each other since 1953, beginning with an annual bonus of 6 percent and a dividend rate equal to 7 percent of the par value of BASF shares. As dividends increased, the margin remained the same through 1957. In 1958 the difference stretched to three percentage points; in 1959, to four. The year 1964 was the first time that the annual bonus did not follow the appreciation in the dividend, whose rate had reached 20 percent, whereas the annual bonus remained at 14 percent. In 1967 and 1968 the annual bonus was even frozen at the previous year's total sum, whereas the dividend in 1968 soared to a record high of 22 percent. In practice, "capping" meant shrinking the bonus, although the company's earnings continued their strong growth through 1969. In 1970 the bonus fell from 14 percent of the 1966 annual income to 12.5 percent, when BASF

¹⁷⁹ Minutes of the managing board meeting of March 21, 1966; BASF RA.

¹⁸⁰ Personnel department to Timm, Heintzeler, and Moell regarding the establishment of a working group for works councils of the BASF Group, October 7, 1968, attachment 3 to 32/68; BASF RA.

ignored the plummet in earnings and made a point of maintaining a dividend rate of 22 percent.¹⁸¹ Knowing this background, one can understand the importance attached to the annual bonus in the pay negotiations of 1971. However, the outcome of the wage and salary dispute also showed that the negotiating parties could take downward adjustment only so far before the fronts would begin to harden.

A less spectacular, but ultimately more auspicious, strategy for focusing monetary and social perks on corporate success was to concentrate them on employees with superior skills. These members of the workforce ranged from the master craftsmen and foremen as the “soul of the plant”¹⁸² to the highly qualified salaried employees exempt from collectively agreed terms (*aussertarifliche Angestellten*) and the academics, on whose initiative BASF’s innovative capacity depended. They were all among the accruing number of employees whose knowledge was central to the company’s success. On-the-job monitoring and other control devices were less effective at getting them to give their best than were motivators such as individual economic incentives, status, and new forms of profit-sharing.

Hence, one of the very first decisions for the new managing board to make after the refounding of BASF was the revision of the employment contracts with the academics. The debate centered on splitting the hitherto uniform annual income into a fixed base annual salary and a convertible special bonus that could be coupled to both the company’s success and individual merits. Walter Reppe, who no doubt put priority on the interests of the employees involved, rejected this plan.¹⁸³ His clientele in BASF’s laboratories saw mostly the risks that a flexible salary scheme entailed when corporate earnings declined. In Reppe’s absence, however, the managing board decided to make a third of the pay flexible anyway, “whereas an academic shall have a legal claim to two-thirds of the highest pay he achieves in any one year after 1953.”¹⁸⁴ Moreover, the group of those to receive these so-called V.I.P. contracts was widened from 70 to 130. The antipathy toward an excessively close link between pay and performance was still palpable years later when “people handled in personnel department IV” – the exempt employees – complained “that the fixed base salary is very small in relation to the variable part of the salary and in some cases lags behind the fixed pay of senior employees in personnel department III.”¹⁸⁵

As far as status, too, was concerned, the managing board’s intent was not to level out differences as such but rather to reward performance and initiative individually in order make the individual utility function of

¹⁸¹ Jakob Müller to the BASF managing board, November 4, 1971, attachment 1 to 39/71; BASF RA.

¹⁸² Matthias Seefelder’s judgment in an interview on December 2, 1999; BASF UA.

¹⁸³ Minutes of the managing board meeting of October 5, 1953; BASF RA.

¹⁸⁴ Minutes of the managing board meeting of November 16–17, 1953; BASF RA.

¹⁸⁵ Minutes of the managing board meeting of May 2, 1960; BASF RA.

important employees converge with those of the company. When the German subsidiary of the International Business Machines Corporation (IBM) put its wage earners on par with its salary earners and introduced such changes as monthly paychecks for all, the BASF managing board concluded "that the prerequisites for similar action at BASF do not exist." The board did note, though, that it "would be welcome if social legislation would rectify the line drawn between wage earners and salary earners."¹⁸⁶

BASF soon took a different path. The company was not content in 1960 to stop at introducing monthly wage payment for all blue-collar workers and noncash payment of salaries so as "to align the employees more closely with what was happening in the economy as a whole."¹⁸⁷ Going a decisive step further, BASF made approximately 5,000 wage earners into "factory salary earners" and about 9,500 other wage earners into "honorary salary earners" and treated them in many respects "administratively" as salary earners. This act, which was part of a shop agreement concluded in mid-1960, affected 28 percent of all BASF blue-collar workers and incurred just under DM 10 million of annual costs above and beyond the collectively negotiated standard benefits.¹⁸⁸ A factory salary earner was an employee "whose plant activity, responsibility, and performance are so outstanding that this person deserves the legal status of a salary earner if the plant itself can give it." For example, 1,597 foremen, 300 supervisors, 17 training assistants, 187 machinists and stokers, and 51 line switchmen and signal-box maintenance men fell into this category. By contrast, an honorary salary earner¹⁸⁹ was characterized less by responsibility and a managerial position in the plant than by "years of conscientious work, plant loyalty, and plant commitment" that should be reflected in his status. This category consisted at first of 2,381 craftsmen, most of whom had been with the company for many years; 816 skilled chemical workers; 610 auxiliary craftsmen; and 320 other workers. Henceforth, they were entitled to the same amount of vacation as standard salary earners, the same period of notice before dismissal (six weeks before the end of a quarter), and full pay for up to one month when ill and up to two months if injured in an accident. Honorary salary earners had advantageous company pension schemes as well. And when ill, they received full pay longer than standard wage earners, and in some cases even longer than the six weeks to which the standard salary earners were entitled.

Much to Wurster's regret, both designated groups had to continue using the punch clock "for purely technical and organizational reasons." Whereas there was something rather cosmetic about the 1969 initiative "to eliminate the occupational term 'worker' as far as possible" in favor of "chemistry

¹⁸⁶ Minutes of the managing board meeting of November 17, 1958; BASF RA.

¹⁸⁷ BASF annual report for 1959, p. 36; annual report for 1960, p. 33.

¹⁸⁸ BASF annual report for 1953, p. 17.

¹⁸⁹ The title of an account in *Spiegel*, November 21, 1960, pp. 55-6.

personnel,”¹⁹⁰ status issues had played a more important role at the boundary between standard salary earners and exempt employees. On principle, the path out of the collective employment relationship and into an individually negotiated contract was opened to senior master craftsmen, whose orientation to the company was obvious and “who undoubtedly had to be regarded as experienced managers.” At first they gained this new status indirectly through an engineering career, but since 1973 they have entered it directly.¹⁹¹

With the internal social reforms of 1960 and other similar steps still to come, BASF responded to a development characteristic of the transition from material to nonmaterial production: the unequal distribution of knowledge and skills in companies. This trend was anything but new for this pioneer of “new industry,” but now it spread to the lower level of plant hierarchy after initially appearing only in the special role played by academics. It was not primarily that the percentage of the workforce without solid training steadily declined in the chemical industry and other sectors. More important was that the share of the economy represented by the sector of material production – the manufacturing area proper – shrank to less than 30 percent in the early 1960s, whereas the percentage of value added represented by services and nonmaterial production in the wide sense was expanding ever more.¹⁹² With the research staff representing 15 percent of BASF’s total workforce of 45,000, the company’s 465 academics were only the very tip of the production factor “knowledge,” even within the research area itself.¹⁹³ Of the 1,627 academics employed by BASF in 1960 (3,800 in 1995), 1,517 had university degrees in the natural sciences or engineering.¹⁹⁴

By the mid-1960s the company’s efforts to intensify the motivation and initiative of the employees focused mostly on the exempt group, which swelled to 4,700 people by 1971.¹⁹⁵ In personnel departments IIB and III, the instructions since October 1962 were “to differentiate salary levels very individually according to how the particular person performs.”¹⁹⁶ At Timm’s suggestion, Friedrich Dribbusch, the managing board member in charge of personnel issues, later divided the exempt employees into 11 grades and

¹⁹⁰ Minutes of the managing board meeting of January 27, 1969; BASF RA.

¹⁹¹ Dribbusch to the members of the managing board regarding reclassification of senior master craftsmen as employees with individually negotiated contracts, February 28, 1973, attachment 1 to 5/73; BASF RA.

¹⁹² On this point see the figure entitled “Personal nach Arbeitsbereichen” BASF annual report for 1962, p. 35.

¹⁹³ Research costs 1961, June 14, 1962, attachment 1 to 17/62; BASF RA.

¹⁹⁴ BASF annual report for 1960, p. 32.

¹⁹⁵ “Vermögenswirksame Leistungen an AT-Mitarbeiter” [Asset-creating benefits to employees with individually negotiated contracts], note dated August 10, 1971, attachment 7 to 29/71; BASF RA.

¹⁹⁶ Minutes of the managing board meeting of October 15, 1962; BASF RA.

allotted specific privileges to each one.¹⁹⁷ This system of privileges embraced a broad compass of special benefits ranging from the floral decoration of one's office to better conditions after accidents, illness, or death and a company car with a driver. In matters of providing for old age, the company also elaborated a new system tailored to the needs of exempt employees. As of grade 6, managers left the jurisdiction of the personnel department responsible for this group and transferred to the department of senior management, which answered directly to the chairman of the managing board. In 1970 this ruling covered 180 employees. Grade 1, obviously reserved for the chairman of the managing board, was treated as a secret even among board members, but it is known that as of 1966 a Cessna – shared at first with Mannheim Machine-Builders Brown Boveri & Cie. (BBC) – stood ready at the Mannheim-Neustadt airport for the personal use of Timm, who occasionally piloted himself and his family to the banks of the Saône River for Sunday lunch at “Paul Bocuse.”¹⁹⁸ Like all exempt employees, Timm also received a convertible special bonus that nearly doubled his income in good years. His basic salary was approximately five times that of a trained researcher, a relation that has changed little since then.¹⁹⁹

Research, Technology, Application: Customized Quality Production

Wolfgang Magener had just finished explaining to the other members of the managing board that all forecasts indicated a successful 1962 for BASF when Bernhard Timm interrupted routine in the Monday gathering of the company's top managers. Wurster's deputy asked his colleagues to lay aside operational business for a moment in order to ponder about a really serious problem. “In earlier years German chemical companies acquired a major sales edge by setting up the Technical Service. Since then, this Technical Service has become a common good of all major chemical companies in the United States as well. BASF should therefore try to find a new recipe that gives the company a new edge.”²⁰⁰ Timm had thereby begun to prepare himself thoroughly for the foreseeable moment at which he would assume responsibility. He was in search of a formula for future success. Beyond the rosy present, he saw Aweta, the applications department, facing a new challenge, one he felt would be absolutely crucial to the future direction of the company. In mentioning applications, which had been concentrated in Aweta since the early 1950s, Timm had indeed cited a traditional secret recipe of the German chemical industry's competitiveness: the capacity to adapt its

¹⁹⁷ Dribbush to the members of the managing board, August 31, 1970, attachment 3 to 4/70; BASF RA.

¹⁹⁸ Minutes of the managing board meeting of May 9, 1966; BASF RA.

¹⁹⁹ Interview with Dr. Bernhard Timm, Jr., on November 15, 2000, in Bielefeld; author's archive.

²⁰⁰ Minutes of the managing board meeting of April 2, 1962; BASF RA.

manufacture of goods to the individual customer's wishes and needs while maintaining a high level of quality. Aweta's task, in short, was customized quality production.

Not that the chemical industry had a monopoly on it. Customized quality production was a general strength of the social system of production that had arisen in Germany (and other countries of Central Europe) in the late nineteenth century. That system's main trademark was the long-term entrepreneurial outlook and a bent for quality work.²⁰¹ In most "new industries," such as electrical engineering and machine building, the principle of customized quality work was plainly reified in made-to-order industrial machines and plants. With many chemicals, however, it was concealed behind the uniformity of mass production. Nevertheless, BASF did not generally sell just commodities to its customers (businesses from a dozen different branches of the economy). The end product in question was usually linked closely with the know-how needed to manufacture it – ideas, technical information, and various suggestions for best application. Moreover, BASF was a traditional leader in developing innovations in process engineering that often drew on practical knowledge and combined cost-consciousness with a technology uniquely fit to the customer's need.

BASF was thus not simply a producer of chemical products but also a builder of entire plants for its own needs and the needs of others. Its 12,400 employees in the department of technology and engineering in 1957 made up no less than 39 percent of the company's total workforce.²⁰² Although Aweta had its roots in the classical production of dyestuffs, BASF's technical competence harked back to the innovations in high-pressure technology that, under Carl Bosch, had marked only the beginning of great achievements in process engineering. After the company's rein corporation from 1952 to 1953, both areas continued as solid foundations of the corporate culture. So did research, which, like Aweta and engineering, characterized the major German chemical companies in general. It was exceptionally well established at BASF, however. In that sense, little had changed since the days of the Farben trust.

Soon after the reincorporation of BASF, the Colorist Department (originally known as the Technical Dyehouse when it was formed in 1891) was renamed the applications department in recognition of the fact that its task area was now extending ever further beyond the use of dyestuffs and dyeing aids. Some 1,350 people were working there in late 1956, including 350 chemists, physicists, engineers, and technicians with postsecondary degrees.²⁰³ The company had invested DM 40 million since 1952 to test the use

²⁰¹ Streeck, *Conditions*; Soskice, *Globalisierung*; Abelshauser, *Umbruch*.

²⁰² Das Ingenieurwesen in der BASF [Engineering at BASF], BASF annual report for 1957, p. 18.

²⁰³ Die Anwendungstechnik in der BASF [Applied technology at BASF], BASF annual report for 1956, p. 23.

of its products under the conditions "existing for our customers, say, in a tannery, textile finishing plant, paper mill, synthetic fiber factory, or die-casting plant."²⁰⁴ Advising the customer was the priority of this work. Nearly 2,000 trips to buyers at home and abroad, 80,000 inquiries, and 6,000 visits by customers attest to the intensity of this interaction, as do the numerous courses given for users and the hundreds of leaflets and instruction sheets that were prepared. Another costly and time-consuming process was that of taking a new or improved product from its invention to marketability. The experimental dyeworks of Aweta's textile section alone tested no fewer than 2,471 new synthesized textile dyestuffs for practicability in 1956 and examined about 360,000 individual samples for fastness. Nine other departments – leather, furs, paper, lacquer, raw materials for plastics, raw materials for lacquers, raw materials for textiles, measuring and testing, and organic intermediates of the pharmaceutical and cosmetics industry – rounded out the wide spectrum of testing facilities designed to guarantee BASF's high quality standards and close customer relations. In the early 1960s, Aweta's growing importance was manifested architecturally, too. Its grand new building on Brunckstrasse had more than twice the space of the commercial department, which was housed in the Friedrich Engelhorn high-rise.

Aweta was BASF's multipurpose corporate weapon that could be used in sales or development, depending on the cyclical situation. It was extolled as an ace in the hole that boosted turnover in emergencies, and it was condemned as a rampant, cancerous tumor with a dubious cost-benefit ratio. Like the department of technology and engineering, it often served as a quarry and secret reserve when problems arose on the labor market or credit market. Each successive head of sales therefore developed the habit, as Julius Overhoff did, of constantly pressing for "considerable reinforcement and improvement of customer service by Aweta technicians."²⁰⁵ Magener, however, wanted to cut costs in that very sphere "because our service facilities outstrip our earning power, especially in the area of engineering and Aweta."²⁰⁶

Yet it was Aweta to which people turned if the earning power of a product at the end of its highly innovative phase began to waver under the barrage of market competition. An example was the situation on the market for Styropor®, the future development of which became a source of concern at BASF in 1963 after rival factories had appeared in patent-free countries, for Ludwigshafen could compete with them only by drastically reducing the product's price.²⁰⁷ Dow Chemicals – both the U.S. partner and keenest competitor of BASF – had been very active in Europe selling foamed polystyrene panels under the trademark "Styrofoam" and had unsettled BASF's

²⁰⁴ Ibid., p. 24.

²⁰⁵ Minutes of the managing board meeting of November 21, 1960; BASF RA.

²⁰⁶ Minutes of the managing board meeting of October 2, 1967; BASF RA.

²⁰⁷ Minutes of the managing board meeting of October 7, 1963; BASF RA.

customers. Aweta hurriedly had to address problems like flame resistance, grain size, grain distribution, and high-frequency defoaming in order to extend the extremely profitable segment of the product cycle. The managing board quickly agreed that “heightened competition is just what necessitates increased effort on our part, including attention to the technological practicalities of this important area.”

Aweta’s strategic importance in such cases made it clear what “new recipe” was needed to supercede applied engineering that competition had overtaken – a better Aweta, notably because the social system of German chemical production remained a fertile seedbed for it. The department’s pivotal role within BASF’s development and marketing concept was thus never disputed even in the Timm era, and his successor, Matthias Seefelder, likewise accorded it “high priority.”²⁰⁸ Precisely because Aweta straddled research and sales, however, it long lacked a fixed place in the corporate organization and perpetually had to guard against being subsumed by one side or another.

The organizational restructuring of the operational units into four production divisions in 1962 did not make this job any easier. As of 1963, the managing board organized applied technology into two mutually independent applications departments (Aweta I and II); assigned them to divisions IV (mainly dyestuffs) and III (mainly plastics), respectively; and thus spatially separated them as well.²⁰⁹ At the same time, however, the board revised a 1961 decision according to which Aweta’s customer-service personnel were supposed “to report to the head of sales” rather than to the head of development.²¹⁰ That operating procedure had proved unworkable because it interfered with the communication between the two departments and thus violated a basic principle of applied engineering: the synergy between development work and sales. In 1963 the reporting between Aweta and the sales department was therefore confined to a few staff officers and external engineers stationed in the parent company and was made quite temporary in each case.

A similar issue confronted research at BASF. Developments in chemical engineering essentially used to be the starting point of the budgeting for the separate research areas.²¹¹ The question of whether it made sense to continue research on a given area or whether it would not be better to tread new paths never surfaced. BASF followed the same lines of research from the 1920s into the 1960s, with the focus being “Reppe chemistry.” The span of this work ranged from the raw materials acetylene and ethylene to low-molecular-weight building blocks to the polymerization processes in which

²⁰⁸ Interview with Professor Matthias Seefelder on December 2, 1999, in Ludwigshafen; BASF UA.

²⁰⁹ Minutes of the managing board meeting of December 17, 1962; BASF RA.

²¹⁰ Minutes of the managing board meeting of November 24, 1961; BASF RA.

²¹¹ Minutes of the managing board meeting of June 18, 1962; BASF RA.

the high-molecular-weight products of plastics form. Close attention was paid to the study of catalytic pressure reactions with acetylene, ethylene, and carbon monoxide, one of the special areas engaged in by Reppe, who was responsible for BASF research until 1957. Originally, however, their economic perspective was closely linked with coal-based chemistry, which was fading from the scene in the early 1960s and making way for chemistry based on petrochemical raw materials. This shift did not eclipse the fascination with Reppe chemistry, particularly since it could also be developed on the basis of natural gas. But the technological momentum of coal-based chemistry and its own possibilities for synthesis seemed to have been broken once and for all. BASF research in the early 1960s verged on a phase of reorientation that seemed imperative for the manufacture of ethylene and vinyl chloride. In practice, though, such decisions did not come from the full managing board but rather at best from the "routine" interaction between the heads of the production divisions, the research units, and the sales areas of the research management board, if not from senior researchers themselves.²¹²

The many research successes in the 1950s stood on their own merit. They broadened the raw materials base and created new assortments of dyes for synthetic fibers. The fluidized-bed process for roasting pyrite; new ways of producing synthesis gas; the autothermal transformation of methane into acetylenic and hydrogenous gases; the cracking of liquid hydrocarbons to obtain acetylene, ethylene, and high-molecular-weight olefins; new building blocks for plastics; and their polymerization into plastics themselves are all links in an impressive chain of research results.²¹³ But there emerged no new major innovative challenge comparable with past glories such as the indigo synthesis or the catalytic high-pressure synthesis of ammonia. By the early 1960s, there was a need for a basic entrepreneurial decision on the direction that research should take.

By design, BASF's research facilities in the 1950s typically placed "central" research in the major scientific laboratories side-by-side with "decentralized" research at very different places in the production area and Aweta. The intention was to ensure a "healthy" relation between basic research and its application to operational problems within the plant. The work in the major scientific laboratories – the main laboratory in the south and the ammonia laboratory in Oppau – went far beyond the horizon of production. They operated under the same supervisory authority but pursued relatively independent paths of research. In addition to the classical dyestuff program, the main laboratory dealt with inorganic issues; catalytic reactions of acetylene, the olefins, and carbon monoxide; the development of plastics; dyeing aids; and crop protection.²¹⁴ It was the center of Reppe chemistry, too. Two independent facilities were later established in the main laboratory: the plastics

²¹² Ibid.

²¹³ Die Forschung in der BASF [Research at BASF], BASF annual report for 1958, p. 27.

²¹⁴ Ibid., p. 21.

laboratory and the dye research laboratory. In keeping with Carl Bosch's tradition, the ammonia laboratory was intended primarily for long-term research. The academics there developed new, expanded processes and studied problems raised by the momentous switch from coal to oil and natural gas as the company's basic raw materials.

Other research and experimental units were attached directly to the factory departments, such as the long-standing alizarin laboratory and the azo laboratory. The Physical Plant's laboratories and experimental workshops, in which new apparatuses and methods were developed for monitoring and controlling the production processes of the works, gained in importance. This work of the physicists had long shown the path to new ways of managing large-scale technical systems in the plants of the chemical industry, and automation only enhanced its significance. Furthermore, BASF conducted research in the Agricultural Experimental Station and the Institute of Industrial Hygiene and Pharmacology. The researchers in Limburgerhof collaborated with Aweta on the study of the affects that mineral fertilizers have on phylogenetic growth and crop yield. They tested the new crop protection products from these laboratories. The work of the Institute of Industrial Hygiene and Pharmacology focused mostly on protecting the employees and customers by examining the biological properties of substances. The pharmacological responsibilities were narrowly circumscribed as long as BASF did not systematically move into pharmaceuticals.

After the introduction of the production divisions, to which some of the research responsibilities were reassigned, it was obviously tempting to orient the distribution of BASF's research effort more to economic considerations than had hitherto been the case. Magener pressed this point above all, saying: "From now on there is to be a distinction between basic and applied research in the distribution of research funds."²¹⁵ Within applied research, he thought that effort should be divided into expenditures for creating new products and developing new processes on the one hand and for improving existing products and further developing existing processes on the other. Magener hoped that this approach would result in "better control over the use of research funds in the interest of corporate growth and maximization of return on investment." Resolutely backed by Timm, the head of corporate finance sought to instill at least minimal awareness of earnings and profit in the chemists and engineers, who still called the tune within BASF.

This quest to commit them to the principle of economy²¹⁶ was only part of Magener's agenda. In the bygone days of Brunck and Bosch, entrepreneurial strategies were supposed to encourage scientific progress so that its inherent opportunities could be used for economic purposes. By contrast, the entrepreneurial strategies that Magener had in mind made research an instrument for achieving the economic objectives set by the company itself. He

²¹⁵ Minutes of the managing board meeting of June 18, 1962; BASF RA.

²¹⁶ Interview with Dr. Rolf Magener on December 3, 1999, in Heidelberg; BASF UA.

quickly realized, though, that research was too unwieldy to fit the shifting priorities of the corporate policy. Eighty percent of the research budget went for salary, which made up most of the DM 220,000 spent for each research position on average. Most of the researchers were specialists and would therefore have required years to familiarize themselves adequately with any new area they were transferred to. This reality severely curtailed possibilities for shifting research costs.²¹⁷ Magener had to accept that research, like a supertanker, could not change direction quickly.

By the mid-1960s, however, it had for the most part come around to the course he was charting. Only 25 to 30 percent of the expenditures were earmarked for "basic work for the future." The rest served to defend BASF's markets, with funding split about evenly between process development and product development.²¹⁸ BASF research thus had two main tasks. One was to enforce the "law of life of industrial research," which Brunck and Bosch had anchored in the company's corporate culture and which had guaranteed the success of entrepreneurial strategy since the pioneer days of "new industry."²¹⁹ It stated that a major technological challenge often took 10 years or more to bring about solutions that were ready to go into production but that it was necessary for research meanwhile to move on to new challenges in order to keep in time with intangible value added. The other main responsibility of BASF research – shared in close cooperation with Aweta and the engineering department – was to maintain the high standard of customized quality production, which set BASF apart from manufacturers of chemical commodities.

Just as BASF impressed the public with the diversity and beauty of its synthetic dyes at the Paris World Exhibition in 1900, it astounded the world 58 years later beneath the Atomium of the Brussels World Exposition in 1958 not with chemicals but rather with a 40-ton container for high-pressure syntheses. Its design was based on the Schierenbeck winding process, which was capable of withstanding pressures ranging between 5,000 and 6,000 atmospheres.²²⁰ BASF thereby demonstrated its capacity to design and build systems not only for its own needs but for the world market as well. The central design office and a special "project office" were available for this kind of licensed apparatus. Since the early 1950s they had planned and coordinated ammonia plants in Yugoslavia, Spain, Italy, Egypt, and Turkey; methane cracking plants for the production of acetylene in Italy and the United States; polyethylene plants in the United States, Great Britain, Italy,

²¹⁷ Minutes of the managing board meeting of June 18, 1962; BASF RA.

²¹⁸ Minutes of the managing board meetings of February 11, 1965, and February 7, 1966; BASF RA.

²¹⁹ Die Forschung in der BASF [Research at BASF], BASF annual report for 1958, p. 27.

²²⁰ Das Ingenieurwesen in der BASF [Engineering at BASF], BASF annual report for 1957, p. 18. For information on the process developed by J. Schierenbeck, see Timm, *Ammoniak-Synthese*, p. 820.

and Japan; and styrene plants in France and Spain. The relevant departments saw to the actual construction and assembly of the facilities in many cases. Between 1970 and 1995, the BASF engineering department planned and built approximately 120 plants for third parties in about 30 countries.

BASF's decisions on building plants were always based on purely business considerations. The employment situation of the design office was not supposed to be a crucial factor.²²¹ Plant construction came after the main line of business, for the company was not overly interested in pushing the construction of plants abroad for others in the field of chemistry. Partly for that reason, Wurster rejected in 1960 a proposal by Berthold Beitz, the executive manager of the Krupp Group, to institutionalize rather close cooperation between Krupp's industrial engineering and design teams and BASF.²²² Wishing neither to breed new competition nor to share its own know-how, BASF usually accepted contracts only if the client could procure the desired process elements elsewhere and thereby bring the manufacturing facilities on-line even without BASF's involvement. Despite these self-imposed restrictions, the engineering department was by far the company's largest one. Its 12,400 members represented more than 32 percent of the workforce of BASF AG. For that very reason, thinking in technical, engineering categories was among the key characteristics of its corporate culture, a legacy of the old BASF that remained undisputed until well into the 1960s. With 300 academics and more than 600 trained engineers in 1957, this department had the human resources that BASF needed as urgently for maintaining, modernizing, altering, and expanding its own installations as it did for building them competitively for third parties. Throughout the late 1950s, BASF annually took in around 400 apprentices in addition to 500 trainees in the chemical training laboratories.²²³ In the early 1960s nearly half the entire workforce in three departments – technology and engineering, Aweta, and research – may have been occupied with such training.²²⁴ This involvement made them directly responsible for BASF's status as a company whose added value stemmed essentially from nonmaterial production and customized quality work.

3. OLD MARKETS, NEW BASIS: EARLY BREAKTHROUGH TO PETROCHEMISTRY

Old and New Markets

The refounding of BASF in 1952–3 neither changed the company's production program nor oriented it to new product markets. The manufacture of

²²¹ Minutes of the managing board meetings of October 30, 1961, and February 7, 1966; BASF RA.

²²² Minutes of the managing board meetings of August 15, 1960, and February 7, 1966; BASF RA.

²²³ Ibid. By contrast, BASF did not train more than 50 apprentice clerks.

²²⁴ BASF annual report for 1962, p. 35.

dyestuffs was still one of the company's main lines of business, making up close to one-fifth of BASF's total turnover in 1952. The making of nitrogenous fertilizers accounted for an equally big share. That division of the company had considerably widened the original production program with the large-scale industrial synthesis of ammonia from the nitrogen of air and the hydrogen of water. With the development of chemical high-pressure technology, it had also paved the way for the subsequent syntheses of methanol and isobutanol and for the hydrogenation of oil, tar, and coal. High-molecular-weight chemistry had been added as an important new branch of research even before World War II and had brought the company into the market for primary products and intermediates of polymer chemistry. They were based essentially on vinyl polymers, which were derived from ethylene and acetylene. Other condensation products such as kaurit glue, superpolyamides, raw materials for lacquers, and other products important for the processing of plastics (such as solvents and softeners) played more and more of a role, too. Together with other primary inorganic products and organic intermediates needed for the manufacture of dyestuffs in BASF's own plants and together with the raw materials for plastics, they constituted nearly half of the company's total turnover in 1952. Ten percent of the revenues came from licenses and project design.²²⁵ BASF also served a number of special markets that had a certain importance for the further development of the production program, though no visible impact on total turnover. They included crop protection products, aids for treating textiles and leather, and a small petroleum refinery. Except for these singular products, BASF held strictly to the principle that IG Farbenindustrie had always kept: Do not compete with your own customers. That is, do not move into the market for final consumer products; concentrate instead on supplying the chemical industry and small industry with primary and intermediate products.

The medium-term developmental trends during the reconstruction period thus pointed to stable markets for investment planning that did not require a flair for venturesome business strategies and decisions. The German plastics market, whose growth rates between 20 and 30 percent in the 1950s outpaced even the headlong industrial reconstruction characteristic of that period, provided more sales opportunities than the company could follow up on no matter how hard it tried. Among the polymerization products, polystyrene became a nearly inexhaustible growth market. Foaming polystyrene, which BASF marketed under the name Styropor, found a ready market as thermal insulation, lagging, or molding in more than just the construction sector, the field of refrigeration engineering, and the packing industry. The material penetrated nearly all areas of the economy and everyday life, becoming a trademark of BASF. The same was true of Lupolen (polyethylene from

²²⁵ BASF, *Bericht*, p. 41.

BASF in Ludwigshafen), a plastic obtained by means of the company's high-pressure technology. It enabled BASF to deliver top quality for a variety of applications and gradually dispelled the end consumer's disparaging image of plastics as substitute material.

The manufacture of raw materials and aids for synthetic fibers such as nylon and perlon (polyamides) constantly ran at very near full capacity and could scarcely keep up with the demand from the expanding client factories in Germany and abroad. These patterns of growth were particularly true for AH salt, caprolactam, acrylonitrile, and dimethyl terephthalic acid, all fiber raw materials for whose manufacture BASF had developed processes that made the company a competitive supplier on the world market. That is why BASF advanced during the 1950s to become the world's chief producer of fiber primary products, reaching a capacity of 150,000 tons a year in 1965.

An equally successful, distinctly BASF product that had already been developed in the 1930s was polyisobutylene, known as Opanol®, a waterproof lamina for buildings. The broad plastics program later came to include three other products. One was polyester, which was used under the trademark Palatal® for containers, panels, and coatings of all kinds. A second product was free-flowing polyamides, which, under the name Ultramid®, figured in the manufacture of heavy-duty moldings in machine-building and the construction industry. A third latter-day product in this plastics program was yet another of the Farben trust's innovations in the 1930s, polyurethane, which had many technical uses as soft, hard, elastic, and heat-resistant foams.

As this list shows, BASF's range of products, notably the dyestuffs and fertilizers, kept to traditional paths. But given the kind of demand that existed during reconstruction, they led to commercial success. Even the most recent and most dynamic area of business, the production of raw materials for plastics, was able to build squarely on BASF's own developments from the prewar period and gave reason to hope for markets with long-term growth. However, the German chemical industry in general, and BASF above all, faced a more precarious situation when it came to acquiring and developing a future basic supply of raw materials. The decisions required by that area of the business entailed profound long-term consequences for the fate of the company. In the early 1950s BASF production and the kind of commodities the company could offer still depended completely on a small number of its traditional raw materials: water; air; coke; coke-oven gas; pyrite; rock salt; lime; and products of coal-tar distillation, such as benzene, naphthalene, phenol, and cresol.

At the beginning of the 1950s, this raw materials base seemed essential, especially from the German perspective. First, alternative raw materials such as oil and natural gas lay far beyond the economic reach of the German chemical industry. The country had neither the logistics nor the foreign currency for the radical shift required to base production on a different type of raw material. Second, German chemists and engineers still saw coal-based

chemistry and its associated processes as a future-oriented technology with a great deal of economic potential left. The key German chemical companies hoped to gain a competitive edge from it. Oil did not become a serious rival to coal mining in Germany until after the Suez crisis of 1956. Until then, all experts had agreed that global oil reserves were limited and that the economic significance of coal could increase for the foreseeable future.²²⁶ It was therefore no coincidence, and certainly no fit of nostalgia, that BASF did everything possible before its refounding to secure not only its part of the Duisburg Copper-smelting Plant (for pyrite) and the incorporation of the Steeden lime-works on the Lahn River (important for the production of fertilizer and carbide) but also a 100 percent participation in the Auguste Victoria mine. Granted, BASF had to pay the Ruhr coal syndicate's list price just like any other buyer, but the company thereby pretty much guaranteed itself the necessary qualities of the coke and coal needed for its specific processes.

Against this backdrop, it did not seem necessary for BASF to turn from coal-based chemistry anytime soon. Nor did its central line of research in any way suggest a radical departure from the traditional base of raw materials. Quite the contrary, BASF research was heavily influenced by Walter Reppe, who had been going down entirely new roads in polymerization since the 1930s. Using acetylene and high-pressure technology, he had developed numerous new plastics and had improved the processes for creating known ones. Since 1937, Reppe had directed Ludwigshafen's main laboratory, where experiments had focused on reactions of acetylene, ethylene, and carbon monoxide to catalytic pressure, work that had earned his line of research its reputation. In the refounded BASF, he served as the managing board member for research until he retired in 1957. In many respects, the "Reppe chemistry" he represented entered into an intimate symbiosis with coal-based chemistry. Reppe's acetylene chemistry rested mostly on calcium carbide as the raw material, which was created from quicklime and coke in an electric furnace. By means of reaction with water, this process produced acetylene, an extraordinarily reactive hydrocarbon that was converted into monomeric vinyl compounds whose polymerization led to numerous synthetic compounds. It thus became possible to manufacture polymers that would have been very difficult to obtain any other way, so they definitely had an important role to play in the production of organic chemicals.

Despite BASF's solid footing in the coal sector and its affinity for one of the most promising developmental paths of coal-based chemistry after 1945, the company helped pioneer petrochemistry. BASF was the first of IG Farben's successor companies to embrace the new technology. This shift had good reasons, none of which alone was compelling enough to warrant anything as drastic as a switch to different raw materials. People knew, particularly

²²⁶ Armand, et al., *Ziele*, pp. 16, 19.

in Ludwigshafen, that coal-based chemistry and petrochemistry were fundamentally two alternative and competing technologies with two very different "philosophies" behind them. But they also knew that no sharp line existed between these two worlds of chemistry. Coal and oil had their separate roles as raw materials of chemical processes, but they could also play an important part together. It was therefore thoroughly consistent with BASF's entrepreneurial principles for the company to want to hold its own in the petrochemical area in order to keep open all options offered by progress in the chemical industry. Unlike coal-based chemistry, which had been mastered, petrochemistry was still largely unknown territory for the German chemical industry as a whole in the early 1950s. BASF was an exception, however. On the eve of World War II, the company had begun watching the Imperial Chemical Industries (ICI), which had been working on the production of polyethylene for the manufacture of plastic based on petroleum. During the war, BASF managed to close the gap with ICI and to produce a significant amount of the plastic Lupolen H, which was well suited as insulating material for electrical appliances. Production in Ludwigshafen resumed in the fall of 1947, and by the early 1950s BASF had already reached a capacity of 50 tons a month at a level of quality it believed superior to the ICI product and close to the standard of DuPont, which had meanwhile become the leading manufacturer of plastics.²²⁷ Nonetheless, BASF was prepared to recognize the older patent rights held by ICI and acquired a license for Germany in 1952 in order to keep rival companies from coming into possession of the BASF process, which was protected until 1965.

Ludwigshafen researchers in the 1930s had made major contributions to the development of the petrochemical processes as well. They found ways to produce acetylene – the crucial building block for manufacturing polymers – not only from the intermediate product calcium carbide by starting with coke and lime but also from the thermal cracking of methane (natural gas) or from by-products of petroleum refining. Hans Sachsse found a method based on the partial oxidation of methane with oxygen. In a flame reaction, this incomplete combustion gives rise to a mixture of the gases acetylene, hydrogen, and carbon monoxide. After the acetylene is separated out, the mixture can be used as a synthesis gas, as is the case in the manufacture of oxoalcohols as solvents or softeners of PVC. In another process developed in Ludwigshafen, researchers succeeded in using an electric arc to break down methane into acetylene and hydrogen without introducing oxygen. After 1945, BASF therefore had the good fortune of being able to bring its own know-how to bear on both the burgeoning plastics sector and the breakneck

²²⁷ Patentabteilung (Kühn), Bericht über die Besprechung am 26.11.1951 betr. Lizenzvertrag mit der ICI über Polyäthylen [Report on the discussion of November 26, 1951, regarding the licensing agreement with ICI for polyethylene], Ludwigshafen, November 27, 1951; BASF UA, K 31106; for background information, see Stokes, *Oil*, pp. 135–6.

advances in petrochemistry. Business acumen dictated that BASF not miss this opportunity; no one initially associated it with abandoning coal-based chemistry. Such strategic considerations may have been what led to Bernhard Timm's complaint in November 1949 about "how all our research has come under the influence of Dr. Reppe," and to Timm's consideration of ways to prevent bias in the direction of the company's research and production policy.²²⁸

Given BASF's own research achievements, it was easier for the company than for other IG Farben successors to seek partners after 1945 in order to revive the old links to dominant American chemical companies and oil corporations. BASF depended less than its affiliated, or "sister," companies did on technology transfer to facilitate its entry into the production of plastics. The company was wholly acknowledged as an equal partner in this field for the medium term. Moreover, BASF was looking for a reliable supply of raw materials, something that could not be taken for granted in Germany during the 1950s. This need dovetailed with the fact that most of the oil corporations after 1945 were crowding into the processing industry in order to diversify their own production programs by integrating forward markets.

It is has been proven that contacts with former business partners were made in the first years after the war, when BASF temporarily stood under French sequester authorities and seemed anything but able to engage in international cooperation. In January 1948 exploratory talks opened with Standard Oil of New Jersey (Esso), with which IG Farbenindustrie AG had had its closest ties. A meeting with Dr. F. Ruiger took place at Timm's home address, number 1 Am Rosenbusch in Heidelberg. It evidently opened reasonable prospects "to reengage him and to relaunch our activities in the oil field," so regular meetings were agreed on for the immediate future.²²⁹ Timm, who conducted BASF's business usually without the backing of the directorate during Wurster's absence during the Nuremberg trials, judged the meeting to have been "a most promising one" and made up his mind "[to] do my best to push it through."

Further opportunity to revive BASF's oil business presented itself in May 1948, when resumption of production at the Gelsenberg and Wesseling refineries began to take shape. BASF insisted on receiving license fees for the use of its process for hydrogenating crude oil. In April 1949 BASF finally concluded an agreement that earned the company more than DM 10 million from this source for the duration of the arrangement, which lapsed in 1957.²³⁰ Another contact simultaneously in the offing involved an international oil corporation seeking BASF's cooperation. The General Manager of the Chemical Industry Administration at Shell Petroleum Company, William Franklin Mitchell, looked up Wurster and Timm in Ludwigshafen to explore

²²⁸ Timm, Diary, 1949, Sunday, November 6, 1949; PAT.

²²⁹ Timm, Diary, Sunday, January 25, 1948; PAT. ²³⁰ Ibid., Sunday, April 10, 1949.

the possibility of cooperation between the two companies. This encounter, too, was judged positively by Timm, especially since Shell, unlike Standard Oil, was not tainted by having worked with IG Farbenindustrie.²³¹ Whereas the consultations with Esso went nowhere, the meeting with Shell led to the beginning of concrete planning for the construction of a “gasoil-cracking unit” on the BASF premises in Ludwigshafen. In October 1949 Timm worked on the design of the installation with Mitchell and one other representative of the London Shell Group, Marcus Aurelias Matthews, Chief Planning Officer Industrial Development.²³² From BASF’s point of view, it was about operating the crude oil cracking plant with Shell in order to obtain all the refinery products “that may serve us as chemical raw materials.”

Timm, who had meanwhile received power of attorney to represent the company but who still had no formal internal position of power, had already become the driving force behind BASF’s petrochemical project. This commitment intensified when American business partners of BASF invited him to tour numerous chemical production plants in the United States, including the Dow Chemical works in Freeport, Texas, and Midland, Michigan, as well as the Shell Chemical Corporation and the major Shell refinery in Houston, Texas.²³³ During the visit, which occurred from November 28, 1949, to January 20, 1950, preparations regarding “the industrial planning of combined oil and chemical productions” were also made at Shell Development in San Francisco for the negotiations in Ludwigshafen.²³⁴ On this mission, which was “highly important” to Timm, the future deputy chairman of the managing board of BASF AG learned two key lessons. First, he saw the mighty possibilities of petrochemistry with his own eyes, an experience that further stiffened his resolve to go that route. Second, he also realized that, on the whole, there were no unilateral and systematic differences between the standard of research and processes at BASF and that of its American competitors. There was little question that BASF was capable of entering into a partnership in the United States – and hence even less question in Europe.²³⁵

The Founding of the Rhenish Olefin Works

For various reasons, a considerable length of time still passed before commencement of hard-and-fast negotiations about a joint venture between Deutsche Shell AG and BASF. The foremost issue for both the Shell Group and BASF was legal security, which did not seem guaranteed under French sequestration. Although France, in her own interest, had thus far allowed the corporate leadership in Ludwigshafen a free hand to prepare the ground for new business relations, the company was not supposed to join in on

²³¹ Ibid. ²³² Ibid., Sunday, November 6, 1949. ²³³ Ibid., late November 1949.

²³⁴ Ibid., Wednesday and Thursday, January 4 and 5, 1950.

²³⁵ Ibid., Wednesday, December 15, 1949.

negotiations concerning long-term cooperation and important decisions on the future direction of corporate policy. Given this situation, the dates of the inaugural meeting – January 23–24, 1952 – were relatively early; they anticipated the refounding of BASF AG on January 30 and were obviously based on the assumption that completion of the refounding and re-establishment of full independence would occur rather rapidly. The procedures dragged on until March 28, however. No doubt the deep crisis that the Korean War caused in Germany's balance of payments contributed to the long delay. The imbalance made West Germany dependent on financial aid from the OEEC and complicated all international movement of capital, which required approval by the BdL. With such an emergency at hand, approvals from this precursor of the German Federal Reserve were extremely difficult to come by, making foreign investors uncertain about whether they would be able to repatriate profits from German direct investments. Instead, yields from direct investments had to be paid into blocked DM accounts.²³⁶ But foreign investments themselves also required approval by the central bank, which insisted that each be examined "from case to case." The BdL not infrequently denied approval "for currency reasons" and did not let up until May 1952.²³⁷

An end to the crisis in the balance of payments seemed in sight by early 1952, as was the arrangement for successor companies of the Farben trust. This context set the stage for the beginning of the negotiations that ultimately led to the founding of the first German petrochemical industrial plant on August 27, 1953. In London, Shell had "come to the conviction that co-operation with a recognized chemical works should be pursued in the field of chemistry in Germany" and had finally "decided on BASF."²³⁸ In Ludwigshafen, the leading actors had prepared for this moment well in numerous meetings of a task force on questions concerning petrochemistry. They now invited the relevant actors to the Palatinate for the first round of negotiations. Surprisingly, Union Rheinische Braunkohlen Kraftstoff AG (Rhenish Lignite Fuel Union AG) in Wesseling near Cologne was present as a third partner. As a creation of the Rheinbraun Syndicate, Union Kraftstoff was originally involved in the hydrogenation from lignite (brown coal) into petroleum products but had to switch to refining crude oil and heavy petroleum residues when the Allies forbade production after 1945. In mid-1948, the company managed to conclude a contract with Shell for deliveries of crude oil, an arrangement that permitted Union Kraftstoff to expand its capacity rapidly and become a fuel producer to be taken seriously. By-products of the operations were olefins in the form of refinery gases, which could be used to produce polyethylene and ethyl benzene on the basis of oil. It proved difficult to use these raw materials, however, because of the problematic

²³⁶ BdL, annual report for 1950, pp. 59–60. ²³⁷ Dickhaus, *Bundesbank*, pp. 110–13.

²³⁸ Timm, file note of January 14, 1952, about telephone call with Mitchell, Shell Petroleum, London; BASF UA, F9/165.

infrastructure for long-haul transport in the early 1950s. This obstacle thwarted the original idea of building a petrochemical plant for manufacturing Lupolen on BASF premises. A joint venture of this sort had to be sited near Wesseling, though the technical management of the works would still lie with BASF.²³⁹

The Shell Group's nine-member delegation consisted of representatives of Deutsche Shell AG, N.V. De Bataafsche Petroleum Maatschappij (the official name of Dutch Shell headquartered in Den Haag), and the London Shell Group. It was led by Mitchell, who had been preparing the project since 1949 together with Timm, the head of the BASF negotiating team. The interests of Union Kraftstoff were represented by the chairman of its managing board, Carl Müller von Blumencron. All of them were determined to "eliminate a few 'typically German complications'" and to advance the project, "whose outlines are now emerging even more clearly."²⁴⁰ After all the preliminary talks and declarations of intent, the negotiating parties quickly came to the point, concurring on how much of what materials the new plant in Wesseling was to work with and when they should be provided. The group spoke about the use of the transportable components of Wesseling refinery gas in BASF's Ludwigshafen works, discussed the siting question in the vicinity of Union Kraftstoff, and presently agreed on forming engineering work groups that would detail the plans.

Even at this early point it was clear that far more expertise would come from Ludwigshafen than from Shell. More problematic seemed the question of which role the Hoechst Dye Works was to play in using the production of Union Kraftstoff. Shell informed BASF "that the interest of the Hoechst Dye Works in the olefins produced in Wesseling had been declared again in recent days." Hoechst did not want to look on idly and see itself left out. Evidently, Hoechst was alluding to agreements about delimitation of interests among the IG Farben successor companies. But the trust's breakup alone meant that a Wesseling-Shell arrangement with Hoechst would rule out the inclusion of another IG factory. At this point in the negotiations, Wesseling seemed quite inclined to serve both IG Farben successors, though the lion's share would go to BASF. The team from Ludwigshafen considered it "undesirable" to have Hoechst, BASF's competitor, take part in the project even as a junior partner. BASF simply did not want Hoechst involved in the endeavor.²⁴¹ Indeed, BASF

²³⁹ Patentabteilung (Patent Department), Bericht über die Besprechung mit der Shell-Gruppe und Wesseling am 23. und 24.1.1952 in Ludwigshafen [Report on the discussion with the Shell Group and Wesseling on January 23 and 24, 1952, in Ludwigshafen], January 25, 1952; BASF UA, F9/165.

²⁴⁰ Ibid., p. 1.

²⁴¹ Patentabteilung, Bericht über die Besprechung mit der Shell-Gruppe und Wesseling am 23. und 24.1.1952 in Ludwigshafen [Report on the discussion with the Shell Group and Wesseling on January 23 and 24, 1952, in Ludwigshafen], January 25, 1952], p. 5; BASF UA, F9/165.

did not see it as an “ordinary over-the-counter transaction” revolving around the purchase of propylene from Union Kraftstoff. The other customers on the list were not a matter of indifference. This project would have a strong bearing on BASF’s future position on the plastics market and called for the close technological cooperation of the partners. BASF was willing to bring in its own valuable know-how but would go to great lengths to prevent it from being passed on to third parties. The same reasoning applied to the new knowledge expected to be gained from the venture, an edge that no one wished to share with Hoechst. BASF clearly wanted nothing to do with a tacit perpetuation of the just recently defunct Farben trust, especially since there was reason to suspect the information policy of the Hoechst Dye Works, which had failed to put the problem on the agenda of bilateral discussions all along.

Shell, too, was determined to keep third parties out of the project if possible. It did not want the junior partner, Union Kraftstoff, to be in on the potentially lucrative main project, the production of Lupolen, and brought BASF over to its side. The two large companies finally tried good words and cunning to exclude this third party from the joint venture and reduce its role to that of producing raw materials. Shell first proposed that Union Kraftstoff concentrate on cooperating on a gas-cracking plant and leaving the two principal partners to tend to the actual business of polyethylene production, which was a separate topic. Also using economic arguments to scare the refinery away from the venture, Shell and BASF AG agreed “to make ethylene chemistry seem as unattractive as possible to Wesseling in order to maneuver Wesseling out of the Lupolen company altogether.” Giving low estimates of earnings from polyethylene and thus calculating a considerably prolonged payout time, the principals portrayed the project as unprofitable for Union Kraftstoff.²⁴²

The ruse worked as intended, for Union Kraftstoff voluntarily withdrew from both projects at the next meeting of the negotiating team. Unable to raise the necessary investment money, the refinery also decided against helping to build the gas-cracking plant. But it did supply the refinery gases needed as raw materials and offered its “good services” for the construction and operation of the big neighboring plant.²⁴³ Hoechst, too, had meanwhile given up trying to push its way into the cooperation by Wesseling. Relieved, BASF told Shell “that Hoechst has now unequivocally agreed not to interfere in the plans for olefin processing in Wesseling anymore” and that no “hard feelings” lingered in the co-affiliate.

²⁴² Timm, Notiz über ein Telefongespräch mit Herrn Gen. Dir. de Graan, Deutsche Shell AG, Hamburg, am 26.5.1952 [Note about a telephone conversation with Mr. de Graan, General Director, Deutsche Shell AG, Hamburg on May 26, 1952], May 26, 1952; BASF UA, F9/165.

²⁴³ Bericht über die Besprechung in Hamburg am 18.6.1952 [Report on the discussion in Hamburg on June 18, 1952, p. 1], June 20, 1952; BASF UA, F9/165.

Another important step forward in the planning was the official supply guarantee that Shell gave in June 1952.²⁴⁴ In January Shell and Union Kraftstoff had concluded a 10-year contract for the delivery and refining of petroleum, with an option on extending the arrangement by five or ten years. It secured the long-term supply of crude oil and refinery gas either through imports (on which restrictive tariffs and taxes could be imposed at any time under foreign-currency and industrial policy) or through domestic German production, which was rising so rapidly that in 1952 it gradually even seemed to replace imports of crude oil.²⁴⁵ In general, BASF's concern about steady supply were to dissipate before long. The world oil market in the early 1950s was controlled by the "seven sisters" (co-affiliates), the tightly organized oligarchy of the major multinational oil corporations, including Royal Dutch Shell. Soon, however, so many outsiders entered the fray that the crowding triggered bitter price wars and led indirectly to a vast increase in the world's known oil reserves. After the Suez crisis, international shipping rates slumped as well and long failed to recover. Although these circumstances set the stage for cutthroat price competition, the market for a large clash between the oil corporations and the "newcomers" did not exist. The governments of important potential oil-consumers such as the United States, Great Britain, and France had subjected oil to import quotas. Only West Germany, which was committed to free trade, offered a worthwhile field of activity for the scrambling oil companies. Until the coal crisis of 1958, they were eagerly received there. Economic policy promoted competition on the energy market because coal's virtual monopoly on energy was seen as the Achilles' heel of welfare-state capitalism and as a constraint on the modernization of West German industry. In 1953 the Bundestag, West Germany's lower legislative chamber and key locus of power at the federal level, lifted the petroleum tax on fuel oil and in 1956 did away with the petroleum tariff as well, dramatically fostering the ascendance of petrochemistry. Until 1957 the amount of crude oil imported into West Germany only edged upward, but it soared thereafter.²⁴⁶ As its consumption in West German households and road traffic rose, the process of refining crude oil produced more and more fission products that the chemical industry could use as the basis for creating a swelling number of plastics and other products at ever better conditions. This development was unforeseeable in Germany in 1952, but the designers of the Wesseling plant tended to agree with the objectives of modernizing West Germany's foreign trade policy. That is, they agreed enough to discuss whether they could call for low rates on import duties or restitution of duties on oil that they processed into "cracked olefins" and, hence, into basic materials of the chemical production process. In principle, the Petroleum Tax Act of 1939 provided for exemption from duties if the oil was used for chemical conversion

²⁴⁴ Ibid., p. 3. ²⁴⁵ Stokes, *Energy*, p. 627.

²⁴⁶ Abelshauser, *Ruhrkohlenbergbau*, pp. 89–93.

into other products rather than for fuel production. However, each case required proof that the duties constituted an excessive economic imposition and that the Ministry of Finance acknowledged this claim. BASF and other interested parties finally managed to surmount this dependence on arbitrary ministerial decisions when the act was amended in 1953.²⁴⁷

The dimension and long-term significance of the petrochemical project for both partners can be inferred from the care with which they selected the location of the planned cracker and the chemical production installations. For technical reasons, it had to be in the immediate neighborhood of Union Kraftstoff's refinery. Having several properties there that were suitable in principle, the planners considered from the outset the possibilities for expansion on the premises. It became apparent early in the discussions that the volume of ethylene expected from Union Kraftstoff could increase rapidly; hence, so could the capacity for processing polyethylene. There was also thought of later complementing the manufacture of Lupolen in Wesseling with other lines of production, an eventuality for which the planners wanted to leave space.²⁴⁸

At first, BASF chose a sizable tract of land south of the refinery rather than Union Kraftstoff's preferred venue to the northwest. But closer inspection by the deputy director, Camill Santo, who had experience in developing new plants, led BASF to push for the purchase of a still greater area to the north of the refinery.²⁴⁹ It was the only place in which Santo saw enough room for expansion to cope with the expected growth in demand and the technical kind of rapid structural change typical of chemical production facilities. He was also keeping in mind the possibilities for spreading out the installations and thus making them less vulnerable to air raids, a precaution that seemed necessary as West Germany geared up to rearm. His colleague Erich Mach estimated that this option would cost an extra DM 3 million because of the additional water and sewage pipes it required. Timm was unfazed, though. He viewed the higher cost as a "down payment on even closer and more extensive cooperation between Shell and us," a relationship that he was solidly convinced had to pay off in the field of petrochemistry.²⁵⁰ Tactically, too, a spacious site seemed best, for Timm always wanted "to be able to threaten [the competition] with future and even greater developments and thereby perhaps prevent even the thought of trying to compete" with BASF. After inspection of the area with Shell representatives, the decision was made for the site between the motor expressway (autobahn) and the Cologne-Bonn

²⁴⁷ Stokes, *Oil*, pp. 100-1.

²⁴⁸ Bericht über die Besprechung in Hamburg am 18.6.1952 [Report on the discussion in Hamburg on June 18, 1952], June 20, 1952; BASF UA, F9/165.

²⁴⁹ Santo to Timm, who was vacationing in Dahme, August 1, 1952; BASF UA, F9/165.

²⁵⁰ Timm to Freiensehner, Patentabteilung, Dahme, August 4, 1952; BASF UA, F9/165.

railroad line north of the refinery. Shell agreed, provided that the costs of the project stayed between DM 53 and 60 million.²⁵¹

During the negotiations, BASF particularly stressed the long-term dimension of the joint venture and repeatedly brought up the issue of steady supply and future possibilities of expansion, whereas "the convertibility of the profit was a critical factor for the Shell Group."²⁵² The existing controls on capital and their restrictive application by the central bank and the German federal government made the conditions for using foreign capital less attractive in West Germany than the neighboring countries of Western Europe. The West German mark, like other European currencies, could not yet be exchanged freely for other means of payment. In Germany, however, lack of convertibility was not the only problem resulting from the unsolved question of debt and forcing the BdL to deal warily with foreign capital. It had not yet been decided, for example, how to proceed with the frozen prewar mark-denominated assets in foreign countries. Shell wanted to use this source to finance some of the investment in the joint venture with BASF. Shell justifiably had reason to hope for a measure of assurance and clarity from pending negotiations between Germany and the Allies on these overriding macroeconomic issues, which led to the conclusion of the London Agreement of 1953. In Ludwigshafen, Wurster surely had early and comprehensive information about the likely outcome of the talks – the chairman of BASF's supervisory board, Abs himself, was heading the German delegation. Shell originally figured on financing anywhere from DM 55 to 65 million, which the partners would share at a ratio ranging between 30:70 and 50:50. Some of the funds would be raised with bonds, some on the open capital market in the speculation that holders of frozen assets would be interested.²⁵³ By contrast, BASF saw itself able to finance its part from its cash flow, so it was dependent on neither the banks nor the still uncertain conditions on the capital market.

By this time, Shell had decided to pursue the joint venture at a ratio of 50:50, signaling that it, too, figured on long-term favorable earning prospects despite all the vicissitudes of the West Germany economy. Shell tried to reduce its overall commitment by up to DM 5 million and to augment the annual capacity for polyethylene from the originally set level of 6,500 tons to 10,000 tons because it estimated domestic and foreign market receptiveness higher than BASF did. The latter's restraint stemmed less from pessimistic predictions of Lupolen sales than from the desire to avoid jeopardizing its

²⁵¹ Freiensehner (Patentabteilung), "Aktenvermerk, betr. Äthylenanlage Wesseling," August 22, 1952; BASF UA, F9/165.

²⁵² Patentabteilung, "Aktennotiz betr. Krackolefine, Besuch bei Shell, London, am 23.6.1952," June 25, 1952; BASF UA, F9/165.

²⁵³ "Bericht über die Besprechung in Hamburg am 18.6.1952," June 20, 1952, pp. 3-4; BASF UA, F9/165.

own plastics business. The idea was not only to produce Lupolen jointly with Shell in Wesseling but also to build up and widen production of Styropor in Ludwigshafen to include supply with ethyl benzene made from ethylene on the basis of oil. BASF had no intention of sharing this business with its partner, although Shell certainly sought to have a part in it and had a degree of leverage on the level of Ludwigshafen's profit because the two companies jointly set the price for ethyl benzene.²⁵⁴

BASF won out in the beginning, but during construction of the facilities the company agreed to enlarge the capacity to 10,000 tons after it was sure that this change would have no adverse effects on the production of Styropor in Ludwigshafen. The final legal and organizational form of the joint venture was decided in September 1952 in Ludwigshafen.²⁵⁵ Shell made it clear that it did not want to confine itself "to the role of a money-lending banker," that it saw the joint undertaking as a chance to integrate its own sphere of business into processing and thereby to advance into new markets. Shell wished to see the new GmbH and the two parent companies enter into a formal, mutually beneficial tax arrangement that "properly reflects the idea of equal partnership." BASF feared that this move could eventually exclude the new enterprise from the unusually favorable conditions of the electricity supply contract that BASF was negotiating with the Rhein-Westphalia Electric Company (RWE), the German utilities conglomerate and leading power supplier in the Ruhr.²⁵⁶ Ludwigshafen also pointed to "considerable" disadvantages that could emerge "in connection with the Labor-Management Relations Act."

In the end, BASF did sign thoroughly balanced articles of association establishing the joint incorporation and operation of ROW. Under its terms, Ludwigshafen assumed de facto management of the new company, brought in its own expertise along with its own patents and the ICI sublicenses, and provided most of the workforce, whose members were even permitted to retain the rights they had acquired at BASF. As a rule, Ludwigshafen and Aweta also had charge of the sales of polyethylene because of the "special importance of the technical support from BASF's Colorist Department." By law, however, BASF had to share power equally with Shell representatives in the management and on the four-member supervisory body – the Direction Committee, later called the Syndicate Committee – of the Rhenish

²⁵⁴ Patentabteilung, "Aktennotiz betr. Krackolefine, Besuch bei Shell, London, am 23.6.1952," June 25, 1952, pp. 5–6; BASF UA, F9/165.

²⁵⁵ Rechtsabteilung (Dribbusch), "Aktennotiz betr. Polyäthylenanlage Wesseling. Besprechung in Ludwigshafen am 8. und 9.9.1952, Rechtlich-organisatorische Fragen," September 15, 1952; BASF UA, F9/165.

²⁵⁶ The contract was signed in early 1954. It allowed ROW, too, to purchase electricity at the average price of less than three pfennigs per kilowatt hour, largely at times of low demand. On this point see Wurster to Abs "betr. Stromvertrag BASF/RWE," March 3, 1954; BASF UA, C 21.

Olefin Works (ROW) to be founded. Moreover, Shell occupied some of the key management and research posts, which enabled it to take positions of control within the workforce of 10 academics, 40 salaried workers, and a maximum of 300 wage workers and to share in joint technological advances. Shell also had equal stakes in the new GmbH's initial DM 16 million of nominal capital, a sum that was increased by another DM 16 million in company loans given by both partners for later conversion into ordinary capital. The German subsidiary of Shell subscribed its share of the nominal capital, and the "Anglo-Saxon" parent contributed the loan drawn on frozen mark-denominated deposits. BASF raised all of its part internally. Although, it was Deutsche Shell AG, Hamburg, that took over the company shares on the other side, BASF insisted on concluding a contract of cooperation with the parent company in order to underscore the importance of this long-term tie and to intensify the Shell Group's sense of responsibility for the project.²⁵⁷

The new company was founded on August 27, 1953, just in time to keep the acquired property options. After laying the basis for the contracts in late 1952, the parties had waited for completion of the founding process in Ludwigshafen and clarification of the conditions for direct investment in West German industry after the signing of the London Agreement of 1953 and improvement in West Germany's balance of payments. The decisive factor in the delay, however, was "technical trouble in the Wesseling cracking plant," which caused Shell to put off closing the contracts on the olefin processing unit.²⁵⁸ With extra expenditures of DM 1.5 million, BASF finally broadened the raw materials base by making it possible to use propane as well as refinery gas for obtaining ethylene.²⁵⁹ Dr. Otto Roser, who did not yet belong to the group of directors and their deputies, was appointed as general manager by BASF.²⁶⁰ Shell appointed Adrian Wellbergen as his partner in the top management of ROW. He was supposed to round out his training during the construction period in order to win his spurs in Wesseling. Men of even higher caliber were therefore appointed to the Syndicate Committee: Timm and Wolfgang Bülow (the responsible department head at BASF) and, as their deputies, Fritz Krieger and Wolfgang Heintzeler from the managing board of BASF. The board attached particular merit to one of the passages in this set of agreements: "Shell views the cooperation with BASF in Wesseling as a prelude to cooperation in one or the other area and will therefore henceforth decide on questions of petrochemistry in Germany only in consultation with BASF." As for the anxiety about the supply of raw materials, the board noted with equal satisfaction Timm's description of "how the BASF negotiators grappled tenaciously with precisely this point and that all achievable guarantees are built into the agreements." BASF waited until

²⁵⁷ *Ibid.*, p. 3. ²⁵⁸ Minutes of the managing board meeting of August 17, 1953; BASF RA.

²⁵⁹ Minutes of the managing board meeting of August 31, 1953; BASF RA.

²⁶⁰ Minutes of the managing board meeting of August 17, 1953; BASF RA.

early 1954 before officially announcing in its 1953 annual report that “a significant step toward introducing petrochemistry into the Federal Republic of Germany has been made”²⁶¹ with the construction of the Rhenish Olefin Works GmbH, the first such installation in West Germany.

Breakthrough

When the Wesseling Works commenced production as scheduled in 1955, it had DM 30 million of capital stock and DM 26 million of additionally necessary long-term company loans. The costs of the project at the time production began were thus at the lower margin of the DM 55 to 65 million that had originally been considered. Not so for the planned volume of production. Even before completion of the plant, improvements in production processes had elevated capacity to the 10,000 tons that Shell had striven for in 1952. Lupolen®, a plastic with particularly interesting properties for which there were many uses in the rapidly growing economy of the reconstruction period, augured well for “smooth sales.”²⁶² Its high electrical insulating capacity made it indispensable in electrical engineering, the manufacture of cables, and high-frequency technology, and its resistance to water, acids, lye solutions, and many other chemicals made it a popular material for manufacturing pipes, bottles, foils, and packaging. Polystyrene, too, which BASF had made since the early 1930s, and ethyl benzene, its intermediate product, which likewise came from the Wesseling works, continued its victory march under the trademark Styropor. In 1955 BASF researchers came up with an impact-resistant variant of foamed polystyrene (polystyrene III). The new product made it possible, for example, to manufacture utensils such as combs from butadiene-rich polystyrene-butadiene copolymer.²⁶³ The widening demand for ROW’s primary products was also partly responsible for pushing the company to the limits of its capacity in the very first year of business. In 1956 the partners therefore decided to double the capital stock from DM 30 to 60 million and spend approximately DM 140 million in order to escalate the capacity of the polyethylene production facilities to 35,000 tons “and simultaneously use new processes.”²⁶⁴

These changes were only the beginning of a rapid and steady expansion that made the works in Wesseling, which had a capacity of 150,000 tons in the early 1960s, into one of the main suppliers of polyethylene in the world.²⁶⁵ It was based on the strategic decision of both partners to develop the capacity to the point of “completely meeting German needs from ROW before expiration of the ICI patents in 1965.”²⁶⁶ The process used in

²⁶¹ BASF, annual report for 1953, p. 13. ²⁶² BASF, annual report for 1954, p. 30.

²⁶³ Minutes of the managing board meetings of April 4 and April 31, 1955; BASF RA.

²⁶⁴ BASF, annual report for 1956, p. 33. ²⁶⁵ BASF, annual report for 1961, p. 28.

²⁶⁶ Minutes of the managing board meeting of April 6, 1959; BASF RA.

Wesseling was also extended to the manufacture of high-density polyethylene, broadening the possible applications in plastics production by bringing in the market for hard plastic. The exclusive license for the necessary low-pressure process, the Marlex 50, had been acquired by BASF in 1956 from the Phillips Petroleum Company of Bartlesville, Oklahoma. Although the process was still in its developmental stages, BASF had to accept high license fees and stiff conditions, such as the obligation to build a major plant that would meet the demand expected on the German market.²⁶⁷ After BASF completed its own developmental work on the process, it issued ROW a "nonexclusive sublicense" with the stipulation that ROW's products from this line of business be sold through Ludwigshafen.²⁶⁸ In October 1954 BASF decided against adopting an alternative way of producing polyethylene on a large scale, a process patented by Karl Ziegler, the director of the Max Planck Institute for Coal Research in Mülheim. The attendant offer by the Gelsenkirchen Mining Corporation to cooperate on the process thus also came to naught.²⁶⁹ There was reason to shy away from the inevitable, but unpredictable, bugs in Ziegler's new low-pressure technology.

Despite these enormous and successful efforts to retain the lead in the area of petrochemistry, BASF by no means neglected the development of coal-based chemistry, on which about half the company's production still depended in the early 1960s. Nonetheless, the Ludwigshafen works progressed swiftly with the fundamental switch to oil as the raw material of production even in areas outside plastics. In 1957 BASF used petrochemical synthesis gases for the first time to manufacture ammonia (in the fertilizer division) "because of the rise in prices for solid fuels."²⁷⁰ In the early 1960s both acetylene – the most important primary product of other plastics – and organic intermediate products built up through Reppe chemistry were eventually obtained from oil. To avoid having to rely on expensive electrocarbides for long periods in order to meet demand for acetylene, BASF built a big plant with a capacity of 60,000 annual tons and powered it with liquid hydrocarbon. To do so, BASF further developed the gaseous hydrocarbon processes it had been the first to apply, extracting carbon monoxide and hydrogen along with acetylene.

The foundation for this approach was the thermal oxygen process, which Sachsse devised in the late 1950s. It enabled BASF to use naphtha and other benzene fractions as raw materials. In view of the headlong motorization that began in the late 1950s, such versatility promised a high level of economic profitability. The steam cracking of naphtha, a procedure developed further at ROW, became the most important method of obtaining ethylene and

²⁶⁷ Arnold to Kleber, October 7, 1955; BASF UA, K 312a; BASF, annual report for 1957, p. 15.

²⁶⁸ Minutes of the managing board meeting of August 31, 1956; BASF RA.

²⁶⁹ Minutes of the managing board meeting of October 9, 1954; BASF RA.

²⁷⁰ BASF, annual report for 1957, p. 17.

propylene, which were cheaper than other olefins and safer to handle than acetylene and therefore gradually supplanted acetylene as the raw material of many plastics. BASF, however, always emphasized the flexibility it had in manufacturing these basic materials: "Our synthesis gas production, which we have fundamentally reconceived over years, allows us to interchange solid and liquid fuels to a large degree and to adapt elastically to the market conditions in the lines of production that depend on them."²⁷¹

In reality, though, the consumption of solid fuels had been declining slightly since 1961 and became completely superfluous for manufacturing synthesis gas and other chemical raw materials after 1963. BASF's vigilance in matters relating to the supply of raw materials is illustrated by how doggedly Ludwigshafen defended the independence of the company's colliery, Auguste Victoria, even at the height of years of crisis in the mining of pit coal in the Ruhr. The stance seemed to defy political and economic reason, for it swerved from the effort to turn the sector around through creation of a single corporation, Ruhrkohle AG.²⁷² The coal output and coke manufacture of BASF's own operations in Marl had not met the parent company's needs since 1956. Fuel oil and, above all, costly imports of U.S. coal had to fill the gap.

Yet even in this predicament, the BASF managing board could not bring itself to decide against coal. Instead, it had Auguste Victoria sink an additional shaft quickly, knowing full well that it would take at least eight years to have any effect.²⁷³ When it became clear in 1963 that the breakthrough to petrochemistry had not only opened up an alternative source of raw material but was irreversibly replacing coal-based chemistry, the principle of cautiously guarding the company's independence in raw materials was duly transferred in Ludwigshafen to the new basic raw material: "To extract these petrochemical raw materials, we have developed especially economical processes based on refinery products on the one side or on either crude oil itself or natural gas on the other, enabling us to adapt flexibly to changes in the situation with raw materials."²⁷⁴

The approach to the economic problems of BASF's colliery demonstrates that coal occupied a place in the company's entrepreneurial subconsciousness for some time to come, although by the spring of 1966 coal was no longer drawn from Marl for manufacturing carbide or synthesis gas. From 1965 on, Auguste Victoria was unable to make a profit despite Ludwigshafen's best efforts to support it. It could not be concealed any longer that the colliery's plight "since the petrochemical conversion" had worsened so much that "it had lost its original utility to BASF."²⁷⁵ The economies of DM 4 to 5 million that BASF reaped through deliveries from its own source were outweighed by

²⁷¹ BASF, annual report for 1961, p. 17. ²⁷² Abelshauser, *Ruhrkohlenbergbau*, pp. 142-3.

²⁷³ BASF, annual report for 1956, p. 11. ²⁷⁴ BASF, annual report for 1963, p. 20.

²⁷⁵ Minutes of the managing board meeting of August 2, 1965; BASF RA.

the approximately DM 10 million in costs “from the incomplete exploitation of fuel oil.” The BASF managing board therefore decided in the summer of 1966 “to write off the participation in A[uguste] V[ictoria] completely as soon as BASF’s earnings allow” and to “mothball” the colliery as it were. In other words, the idea was “to drag it along for a future contingency, but in such a way that no subsidy expense arises for BASF.” Just one year later the pain of subsidization became intolerable. Willi Danz, the managing board member in charge of production after Timm had rotated into the supervisory board, notified the colliery’s managing board that BASF would have to close the colliery if it did not succeed in plugging the financial leaks.²⁷⁶

When the Near East crisis and the civil war in Nigeria seemed to threaten the supply of oil in 1967, Danz immediately had systems analysis conducted in order to identify the “conditions under which the use of AV coal [would be] cheaper for Ludwigshafen than the use of oil products whose price has increased.”²⁷⁷ Someone quickly came across a process, supposedly developed by Union Carbide, that made it possible to produce economically and competitively by hydrogenating coal. Admittedly, the profitability of hydrogenating coal critically depended on the purchase price of hydrogen, which, in turn, was closely correlated with the price of electricity. Making the hydrogenation of coal profitable again was therefore thought possible only “if the development of so-called breeder reactors were to lead to extremely cheap electricity.”²⁷⁸ It was only a short step from there to the “acceleration of considerations of constructing a nuclear power plant,” for the city of Mannheim had shown interest in “perhaps building such a power plant with BASF on Friesenheim Island.”²⁷⁹

BASF had definite hopes that technological progress would come of “atoms for peace.” But even after those prospects had long proved problematic, coal still returned to glory – when the first oil price shock led to bottlenecks (though no shortages) with ethylene in Wesseling and elsewhere in 1973 and 1974. The managing board immediately had experts examine all possibilities for returning to coal technology, which had continued to improve in the meantime.²⁸⁰ The veterans of coal-based chemistry, still rallying around Ludwigshafen IG Farben director Otto Ambros, came from the background to stand at center stage again to help clarify the question of “the extent to which it is still possible to fall back on work of a previous period.”²⁸¹ These episodes, however, were only phantom pains of a technological age that had been consigned to the past once and for all since the mid-1960s.

²⁷⁶ Minutes of the managing board meeting of July 25, 1966; BASF RA.

²⁷⁷ Minutes of the managing board meeting of July 15, 1967; BASF RA.

²⁷⁸ Minutes of the managing board meeting of May 16, 1967; BASF RA.

²⁷⁹ Minutes of the managing board meeting of July 17, 1967; BASF RA.

²⁸⁰ Minutes of the managing board meeting of January 15, 1974; BASF RA.

²⁸¹ Minutes of the managing board meeting of April 10, 1974; BASF RA.

4. TRADITION AND DISTANCE: THE SECOND BREAKUP OF IG FARBEN

Distance

After the breakup of IG Farbenindustrie, BASF seemed to have few links left with the remaining core companies. The Duisburg Copper-smelting Plant was the old group's only facility that was still shared, but this joint procurement and processing of a key raw material did not lead to any enduring initiatives for cooperation. Nor did any appreciable friction ensue. The distribution of the spheres of interest among the successor companies proved surprisingly uncomplicated because it resulted almost inevitably from each spin-off's focal points of production, some of which predated the creation of the trust. BASF had a certain emphasis on the area of nitrogen and plastics, whereas the classical chemistry of the intermediate products, dyeing aids, and dyestuffs tended to fall in the domain of the co-affiliates. This tacit division of labor survived until the beginning of the 1960s.²⁸² Moreover, most of the new companies whose place within this structure could have become contentious after the divestiture lay beyond West Germany's borders and were, if anything, only a secondary concern.

The story was similar for the patents of the former trust. Although their legal integrity outside Germany had been compromised after they were confiscated by the Allies, the tacit production knowledge bound up with the patents was likewise distributed across the main existing lines of production. All the same, property rights protecting the interests of the partners restricted the use of the trust's patents. To avoid getting directly in each other's way, the parties involved had apparently entered into mutual agreements in the period leading up to the disincorporation of the trust.²⁸³

But the trust's successor companies had yet more in common with each other, and it stemmed from the division and idiosyncrasies of the market on which the three main companies in particular now faced off. To begin with, each successor company's shareholders were the same as those of the others, a situation that bred a special competitive relationship on the capital market. In dealings with its owners, each of the companies could not help but always factor in the direct comparison with its competitors so as to avoid serious disadvantages on the stock exchange. The companies watched

²⁸² Report by Timm on the division directors investment meetings of June 4, June 18, July 16, and July 23, 1963, attachment 1 to the minutes of the managing board meeting of August 5, 1963; BASF RA.

²⁸³ No record of these agreements has survived, but occasional reference was made to them when conflicts arose in the pursuit of shared objectives. Such a case occurred, for example, with Hoechst's rights to cooperate with UK Wesseling, a relationship that played a major role in BASF's entry into petrochemicals. See the report on the discussion with the Shell Group and Wesseling on January 23 and 24, 1952 in Ludwigshafen, January 25, 1952, pp. 4-5; BASF UA, F9/165.

each other on the sly in order to stay even in terms of the conditions that each offered its own shareholders. From the outset, though, BASF was not afraid to fall out of step over formalities like the date for the general shareholders' meeting, justifiable technical decisions such as the level of the first dividend payment, or certain terms and conditions for issuing marketable securities. BASF also consciously diverged from its main competitors on some points of its accounting strategy, usually in a conservative direction. It was carefully noted, for example, that Bayer and Hoechst acquired tax-free and tax-privileged securities on a rather large scale in order to enhance the profitability of their current assets.²⁸⁴ But Wurster, who solicited Abs's advice on this subject, did not wish to emulate their example. BASF should "instead continue consolidating its accounts by reducing its liabilities as much as possible." Nonetheless, benchmarking with Bayer and Hoechst was part of the managing board's annual ritual in Ludwigshafen. It was not until 1965 that Timm relieved the Department of Political Economy (*volkswirtschaftliche Abteilung*) of the task of comparing BASF's benefits with those of the trust's other successor companies.²⁸⁵

The second commonality of the successor companies was the fact that the monopoly previously held by IG Farbenindustrie on the German market had metamorphosed into an oligopoly. In principle, this change paved the way for market forms and structures necessary for especially keen competition, but such conditions were precisely what forced the actors to be exceptionally cautious in areas where they competed with each other, unless they wanted to risk ending up with empty hands. Well-established patterns of cooperation and close personal relations between the managers of the successor companies turned this interaction into a unique form of market behavior and led the whole world to suspect that the trust's spin-offs would sooner or later rediscover their mutual interests and recultivate them.

Law narrowly circumscribed such a development. Formally, the breakup of the trust was not concluded until passage of the Final Trust-Liquidation Act of January 21, 1955,²⁸⁶ and the West German government had pledged to abide by this outcome for a certain time. International law thus precluded reconcentration before 1956.²⁸⁷ A re-merger of the trust's successor companies after expiration of this ruling would have seriously damaged West German foreign policy, however. Any effort to restrict competition by forming a cartel, or even by consciously engaging in concerted action short of restoring a unified Farben corporation, also violated the strict ban imposed by the occupation powers. The Allies had reauthorized the German government to legislate competition law after 1949, but they insisted on retaining the

²⁸⁴ Minutes of the managing board meeting of June 21, 1954; BASF RA.

²⁸⁵ Minutes of the managing board meeting of September 10, 1965; BASF RA.

²⁸⁶ *Amtsblatt der AHK für Deutschland*, 1955, pp. 3161–7

²⁸⁷ See Kreikamp, *Entflechtung*, p. 248.

occupation statute until corresponding German regulations existed. These laws were not in place before 1958, and the relatively weak one against restricting competition took a decade after that point to take hold, most notably because of the numerous exceptions it made. The monitoring and fines imposed by the Federal German Antitrust Bureau gradually forged respect for this law.²⁸⁸ After release from direct control by the occupational powers, the trust's successor companies therefore found collusion on certain markets an enormously tempting and not unduly risky way of trying to maximize the profits reaped by all the participants.

In reality, such attempts had existed from the start. In the summer of 1953 the chairman of Bayer's supervisory board and former member of the trust's managing board, Heinrich Hörlein, sent a letter to the supervisory board chairmen of BASF, Hoechst, and Cassela in which "harmonization in matters relating to the sale of dyestuffs" was proposed.²⁸⁹ A few weeks later, it was Bayer's managing board chairman, Ulrich Haberland, who wanted to intensify collaboration. He suggested "agreements on the demarcation of the research areas of the major West German chemical companies"²⁹⁰ – evidently in response to BASF's reduction of prices for a few vat dyes in anticipation of liberalization and the development of prices abroad. Wurster presented these offers to his managing board, but immediately attached them to a clear, pivotal decision that henceforth determined BASF's relationship to the co-affiliates and put an early end to all attempts at building a cartel between the core companies of IG Farben. The managing board adopted Wurster's viewpoint that BASF's interests were best served by an independent policy and that price fixing was out of the question on the market for dyestuffs.²⁹¹ Wurster also strictly rejected the idea of agreements on demarcating research areas, and his managing board followed him. Ludwigshafen saw itself at the forefront of research in this field and was absolutely convinced "that such agreements can only entail undesired constraints."²⁹² The successor companies did regularly hold "scientific discussions," to which Otto Bayer repeatedly invited Reppe. But the BASF managing board consistently decided that Reppe should not accept the "rotating" calls, though it had no basic objection to "discussions about individual, clearly defined topics from case to case."²⁹³

When the Bayer Dye Factories embarked on their sally to create a cartel, they did so at the supervisory board level in order to keep the managing boards away from the line of any legal fire that might erupt. That move, too,

²⁸⁸ See Hüttenberger, *Wirtschaftsordnung*, pp. 287–307.

²⁸⁹ Minutes of the managing board meeting of August 31, 1953; BASF RA.

²⁹⁰ Minutes of the managing board meeting of September 21, 1953; BASF RA.

²⁹¹ Minutes of the managing board meeting of August 31, 1953; BASF RA.

²⁹² Minutes of the managing board meeting of September 21, 1953; BASF RA.

²⁹³ Minutes of the managing board meeting of February 7, 1955; BASF RA.

drew criticism from Wurster because he felt that such issues were something for top management and – far beyond aspects of style – that they could enable the supervisory board chairmen to shift the balance of power between the company's top organs to the advantage of the control body. More important, though, was BASF's decision to slip into the role of the spoilsport among the co-affiliates when it seemed to serve the company's own interest. Wurster was highly aware of this intention's fundamental significance, so he armed himself against retaliation from Bayer and Hoechst. With wise foresight, the managing board decided to gather material documenting the areas of BASF's work that the successor companies of the IG have infiltrated. BASF would then “be immediately able to parry attendant reproaches directed at BASF.”²⁹⁴ In October 1955 BASF's managing board reconfirmed its basic position on “consolidating the field” of IG Farben successor companies: “A demarcation of research pursuits, in particular a general amalgamation of representation abroad, is rejected, as is the subsumption of sales in a Dyestuff-Sales Company.”²⁹⁵

Cooperation

The fundamental decision to protect the independence and interests of BASF did not rule out consent to specific instances of market consolidation, functional demarcation, and cooperation with Bayer and other core companies if BASF expected to benefit. The Ludwigshafen board sympathetically considered “concluding with the Bayer Dye Factories a contract for converting anthracene . . . into anthraquinone and not operating an anthraquinone plant at BASF for the time being.” In return, Bayer promised “for the time being” to forego its own production of maleic acid.²⁹⁶

BASF and the Hoechst Dyeworks likewise entered into forms of cooperation that in some cases went back to arrangements from the period when they were re-established as separate businesses. Honoring a previous bilateral agreement, for example, the two companies evenly divided the trust's 30 percent stake in the Süddeutsche Kalkstickstoff-Werken AG (SKW) (Southern German Calcium Cyanamide Works), which had been completely taken over by the Dyeworks when the trust was broken up.²⁹⁷ In October 1954 the BASF managing board voted to provide somewhat more than DM 5 million for this action. To protect intercorporate tax privilege, BASF and Hoechst founded the Verwaltungsgesellschaft für Chemiewerte GmbH in 1956, each with a 50 percent stake. By contrast, the agreements that Hoechst and BASF concluded in connection with Hoechst's acquisition of Anorgana Gendorf, a

²⁹⁴ Ibid. ²⁹⁵ Minutes of the managing board meeting of October 17, 1955; BASF RA.

²⁹⁶ Minutes of the managing board meeting of October 19, 1953; BASF RA.

²⁹⁷ *Geschichte der Rechtsabteilung der BASF. Von der Gründung bis 1967*, Part V (March 28, 1953, through December 31, 1958), pp. 25–6; BASF UA, B 101.

former IG Farben factory, focused on problems of defining each company's spheres of work. On the one hand, BASF felt "disturbed" that the sale of Gendorf dyeing aids based on ethylene oxide was assigned to Hoechst. On the other hand, BASF coveted Gendorf know-how in the development of magnetic tape and had presented Anorgana a draft contract on the construction of a joint plant even before the Hoechst initiative.²⁹⁸ As the price for the consent to sell Anorgana, Wurster bargained to have IG Farben's know-how in the field of magnetic tape transferred to BASF along with the engineering personnel, who were sent to Ludwigshafen.²⁹⁹ This deal prompted the idea of hiving off BASF's "magnetophone business, possibly in the form of a subsidiary."

Contact for future cooperation was made with the former trust's smallest core company as well. The head of Cassella, Werner Zerweck, conveyed to Wurster "in every way" the offer to participate equally in producing Orlon, the synthetic fiber that DuPont had developed, "with BASF supplying the intermediates." The intention was also for BASF to have a 50 percent stake in an experimental plant and the DM 3.3 million cost of research and development.³⁰⁰ It was estimated that the joint construction of a plant for 1,200 annual tons of Orlon silk and 3,000 annual tons of Orlon fiber would cost DM 20 million. The Cassella Mainkur Dyeworks saw this project as "perhaps also foreshadowing cooperation in other areas." Although this particular venture could not be pursued, it became clear soon after the disincorporation of the core companies that cooperation between them in selected fields of business was both purposeful and feasible and that such interaction did not necessarily result in a new cartel right away.

Platforms for building cooperation existed outside Germany, too, thanks in part to IG Farbenindustrie's old business relations. The first offer came from Fabricación Nacional de Colorantes y Explosivos S.A. (FNCE) in Barcelona, a company that granted BASF and Bayer a participation of 12.5 percent each after a capital increase.³⁰¹ In 1955 the two companies jointly took their places in the FNCE's Consejo de Administración and technical committee. BASF resumed the licensing of its processes in Spain and operated the marketing organization Unicolor S.A. Colorantes y Productos Químicos in Barcelona jointly with the Spanish group.

In France, resumption of production by the trust's successor companies was still inconceivable at this time. Hoechst, Cassella, and BASF therefore wanted at least to consolidate their dyestuff marketing on a grand scale in Sicolor (originally associated with Cassella), "without needing a sensational launch of a new company."³⁰² The plan failed, however, partly because BASF

²⁹⁸ Minutes of the managing board meeting of October 19, 1953; BASF RA.

²⁹⁹ Minutes of the managing board meeting of December 20, 1954; BASF RA.

³⁰⁰ Minutes of the managing board meeting of December 21, 1953; BASF RA.

³⁰¹ Minutes of the managing board meeting of October 19, 1953; BASF RA.

³⁰² Minutes of the managing board meeting of August 16, 1954; BASF RA.

conditions would have amounted to preserving the independence of the Paris BASF sales organization, Imaco S.A., and its director, Marcel François, under the umbrella of the joint organization.

It seemed politically more favorable to plan a new factory for organic intermediates in India, which wanted to participate with Germany at a ratio of 70 to 30 percent, respectively. The idea was to have BASF, Hoechst, and Bayer each have 10 percent of the German stake. The initiative came in early 1954 from the Bayer Dye Factories, this trio's most active member on the Indian market. The project also had the backing of the West German government. The Minister of Economics, Ludwig Erhard, saw the globalization strategies of German foreign trade and the corresponding direct investments as alternatives to what he regarded as the "statist" integration of the Western European markets. In Erhard's eyes India played an important role in those strategies because this emerging industrial country offered "special opportunities" as a sales market for German capital goods and intermediate products.³⁰³ Erhard therefore committed the West German government "to making its services available to prompt German associations, businesses, and individuals to let their experience benefit the Indian government... for the purpose of developing new industries."³⁰⁴ When rumors began circulating that the Federal Republic was considering an involvement of the successor companies for political reasons, BASF put great store in emphasizing that it had not committed itself to cooperating in that field anywhere as yet.³⁰⁵

The skepticism of the Ludwigshafen managing board stemmed as much from the model of cooperation with the two co-affiliates as from the poor outlook for direct investments in emerging and developing countries. In 1952, for example, BASF had opened negotiations with Turkey to revive a project that IG Farben had decided on in 1938 but had never been able to follow through on because of the war. BASF had entered into a partnership with Azot Sanayii T.A.S., Ankara, in 1954 to run a plant for synthesizing ammonia by means of BASF processes based on brown coal, an operation in which BASF was willing to invest DM 30 million.³⁰⁶ Shortly after the plant's creation, however, Turkey's lack of foreign exchange complicated payment and eventually led to a unilateral moratorium, although the Turkish finance ministry had guaranteed the transfer in writing when the contract was signed.

Such experiences contributed to BASF's express refusal to participate in another joint project, this time proposed to BASF by the Bayer Dye Factories in 1957. Compared to the capacity of a new dye factory in Turkey, the anticipated sales appeared to be negligible, not to mention the persistent problems with foreign exchange.³⁰⁷ Moreover, "the uncertainty of the legal conditions

³⁰³ Erhard, *Rückkehr*, p. 138. ³⁰⁴ Ibid.

³⁰⁵ Minutes of the managing board meeting of July 16, 1956; BASF RA.

³⁰⁶ Wurster to Abs, February 7, 1952, attachment "nitrogen project Turkey"; BASF UA, C 21.

³⁰⁷ Minutes of the managing board meeting of April 16, 1957; BASF RA.

in these developing countries continues to make great caution advisable.”³⁰⁸ Similar reflections decided BASF’s refusal to join Bayer, Hoechst, and Indian partners in a different venture in India that led to the construction of a pigment factory in 1959. “Because this specific, individual case is unlikely to affect [our] Indian business,”³⁰⁹ BASF consented to the project, but that was all. On principle, though, it was desirable to make clear to Bayer and the Hoechst Dyeworks that “BASF’s response represents preferential treatment that had to be reciprocated by the other two companies when the time comes.”

As these examples show, the successor companies still had an invisible bond compelling them to confer with each other on certain projects. In practice, though, BASF sought with ever greater determination to extricate itself from this linkage. In the end strong political pressure did get Hindustan Organic Chemicals Ltd. off the ground, but this India project to manufacture organic intermediate products was the final attempt to concentrate the strength of the former IG outside Germany. It did not succeed. Just a year later, negotiations on expanding the project failed, and the German companies even stopped work on it in 1962 because Hindustan Organic Chemicals Ltd. had not paid for the machines and other equipment that had been delivered from Germany for the factory.³¹⁰

Reintegration

Aside from the “Big Three” among the 12 companies into which the assets of the trust were divided, two others were prominent for their undeniable significance to the future of West German chemistry in the 1950s: the Cassella Dyeworks in Mainkur and the Hüls Chemical Works AG in Marl (CWH). In an oligopolistic market their fate could not be a matter of indifference to the three main successors of IG Farben. The finely calibrated balance of the markets could be upset if Cassella and CWH were to come under the unilateral influence of one of the Big Three or, worse still, were to serve foreign competitors as the gateway to the German market. As with BASF, Bayer, and Hoechst, Cassella – the former trust’s fourth core company – was refounded and initially had the same shareholders as they. An appealing range of products, which comprised numerous specialties, high-grade dyes, aids, processed goods, synthetic resins, and pharmaceuticals, soon made the Frankfurt company a favorite on the stock exchange. The price of Cassella’s shares increased more rapidly than that of its direct competitors, enhancing Cassella’s attractiveness as a candidate for takeover. These characteristics

³⁰⁸ Minutes of the managing board meeting of February 3, 1958; BASF RA.

³⁰⁹ Minutes of the managing board meeting of August 3, 1959; BASF RA.

³¹⁰ *Geschichte der Rechtsabteilung der BASF. Von der Gründung bis 1967*, Part IX (1962), p. 9; BASF UA, B 101.

kept the fourth successor company in the sights of its larger co-affiliates as well. At a Zurich meeting in February 1955, a gathering that Wurster otherwise dismissed as a mere social event of no consequence, the representatives of the four successor companies and the Swiss dye industry used the occasion "to discuss the relationship with Cassella"³¹¹ – in Zerweck's presence. Everyone quickly realized that the company did not have the strength to continue in the field of polyacrylonitrile (PAN) fibers, precisely where it was the leader. It was decided to form a four-man committee to address the issue further. To avoid surprises, BASF, Bayer, and Hoechst bought up Cassella shares until they each held 25.1 percent of the share capital of DM 34.1 million, thereby jointly controlling the little co-affiliate. Overhoff took a seat on Cassella's supervisory board for BASF in 1956.

CWH had been planned in the "Buna Ruhr" engineering and design office of the Upper Rhine group in Ludwigshafen in 1937. Soon after it was founded in 1938, it rose to become the second largest producer of synthetic rubber (buna) in the German Reich. The works were co-owned by the Prussian state mining company (*Bergwerksgesellschaft*), Hibernia, which provided the necessary raw material, coal, in close collaboration with the neighboring hydrogenation works of Gelsenberg and Scholven. Hibernia held 26 percent of the capital stock. It was this ownership structure that FARDIP built on to refound CWH in December 1953. Aside from Hibernia, whose stake was reduced to 25 percent, Steag, Ruhrgas AG, and Gelsenberg-Benzin AG also participated with a total of 25 percent, mostly under the influence of the Gelsenkirchen Mining Company (GBAG). IG Farbenindustrie AG in Liquidation had to cede this stake, which was subsumed in Kohlenverwertung GmbH, and thereafter itself held only 50 percent of the capital stock of DM 120 million. That share was subsumed in a management corporation, Chemieverwaltungs-AG, as the "Hüls Holding." In other words, half the title of the owner was challengeable from the outset because the future of IG Farbenindustrie AG in Liquidation was anything but certain. At the end of the war the same was true of CWH, which depended entirely on buna, its industrial monoculture. To meet the enormous Western European demand for this product after 1945, the occupation powers at first permitted CWH to continue making it and its precursors, butadien and acetylen, which Hüls manufactured with BASF's arc process. Production of buna was banned in 1948 but was reauthorized on a very limited scale in response to the Korean crisis after the outbreak of the war in June 1950. Preparing for the seemingly inevitable, CWH had meanwhile broadened its range of goods to include other products of organic chemistry. This diversification was no simple affair after the idea of entering the accustomed domains of the major successors to the trust was abandoned at the company in 1952.³¹² In the end,

³¹¹ Minutes of the managing board meeting of March 7, 1955; BASF RA.

³¹² Stokes, *Oil*, p. 87.

CWH focused on detergents, solvents, and aids of all kinds and on dispersions and polymers such as PVC and linoleum. The company seemed to do quite well on the market with this program, especially since it succeeded in satisfactorily solving other existential problems as well. Moreover, CWH had an experienced, established team of specialists and managers and a relatively new, efficient physical plant. In many respects, however, it still depended on the trust's resources in order to compete successfully. For example, the trust's buna laboratory was located in Leverkusen, and after the "decartelization" of the trust's patents, most of the patents, licenses, and production technologies required in Marl belonged to BASF because they had been developed in its laboratories. BASF therefore had leverage, an advantage it used cautiously and effectively during the disputes over the future of the Auguste Victoria colliery, which lay adjacent to CWH. By declaring itself additionally willing to convert its own octene in Ludwigshafen into nonanol³¹³ and to deliver it directly to BASF on favorable terms, Hüls cleared the way for signing a skeleton contract with BASF on Hüls's use of the trust patents allocated to BASF.³¹⁴ CWH was to pay a lump sum of DM 800,000 to Ludwigshafen for the deal.

After the outbreak of the crisis in Korea, the wind shifted again on the political market for synthetic rubber. The West German government was now interested in restoring buna production to a level in keeping with the country's interests in terms of foreign exchange and industrial policy. It began by making buna competitive against imports by allowing cross-subsidization of synthetic rubber through a compensation fund of the rubber industry's business association, the Wirtschaftsverband der Kautschukindustrie (WDK). The government then turned to ensuring West Germany's supply of rubber in principle by building a large, efficient plant equipped with state-of-the-art methods to achieve competitiveness. For CWH, this strategy meant two things. Technologically, it had to obtain U.S. licenses, which had become the standard for buna. Economically, it had to seek financially sound partners if it did not want to sacrifice the welcome level of diversification it had attained. CWH tackled the former task with the aid of the West German government and with its own ability to offer the principal licensor, Firestone Tire & Rubber Company, interesting know-how in the field of styrene, polyamides, and PVC in return.³¹⁵ In search of well-funded industrial partners, the head of CWH, Paul Baumann, started by approaching Ludwigshafen, which, unlike Leverkusen, had no buna interests of its own.³¹⁶ Wurster postponed the decision, however, because he was waiting to see what came of an alternative being discussed by the trust's three successor companies: the creation of an

³¹³ Ester components for the manufacture of softeners.

³¹⁴ Minutes of the managing board meeting of June 21, 1954; BASF RA.

³¹⁵ Stokes, *Oil*, p. 205; Kränzlein, *Chemie*, p. 125.

³¹⁶ Minutes of the managing board meeting of October 9, 1954; BASF RA.

independent enterprise, half of which would be financed by CWH and the tire industry and the other half by the “Big Three.”

When the Hüls Buna Works GmbH (BWH) was finally founded in June 1955, the tire industry was no longer involved. The project had instead become the trailer for a much larger one (a “big Hüls solution”) intended to bring the trust’s successor companies back together in an important area of chemical production. Half of BWH’s shares in the business were taken over by CWH; BASF, Bayer, and Hoechst each took over 16.66 percent of the other half. The plant was completed in September 1958 and was scheduled to commence operations with a capacity to produce 45,000 tons of synthetic rubber annually. This remarkable attempt to make buna competitive under market conditions (after the originally requested and approved subsidies from the West German government failed to materialize)³¹⁷ interested the contracting parties far less than the actual underlying intention of jointly controlling both BWH and CWH.

In April 1955 all the actors concerned gathered in Düsseldorf to prepare what was later called the “agreement on principles” for a big Hüls solution.³¹⁸ Hibernia, which was now owned by the West German federal government; the Essen Coal Utilization Company Limited (*Kohleverwertungsgesellschaft mbH*), in which Steag, Ruhrgas, and Gelsenberg Benzin were represented; and the three successor companies of IG Farben all agreed “that the mining companies on the one side and the trust’s successor companies on the other shall have a 50–50 stake in the Hüls Chemical Works, meaning that they will jointly control the Hüls Chemical Works.”³¹⁹ The objective was supposed to be “effective parity and genuine partnership.” It was agreed that the successor companies would acquire as many shares of the Hüls Holding – Chemieverwaltungs-AG – as was necessary for control of the company as soon as it was legally and practically possible. The mining companies promised to support this effort of the successor companies “in every way” and to refrain from anything that could thwart the fulfillment of this goal. After this inaugural step, the relative percentages of investment in the new buna works in Hüls were to be changed so as to equalize the stakes that the contracting parties had in this company, too. In the unlikely case that this objective was not accomplished “in due time,” both sides would seek solutions “in order to create conditions commensurate with the desired objective for the complex consisting of the Hüls Chemical Works and the Hüls Buna Company together.” BASF estimated that this operation would

³¹⁷ Stokes, *Oil*, pp. 214–15. ³¹⁸ The agreement itself dates from May 23, 1955.

³¹⁹ Draft formulation for one letter each from (1) Bergwerksgesellschaft Hibernia AG in Herne and (2) the Kohleverwertungsgesellschaft m.b.H. in Essen to (a) Badische Anilin- & Soda-Fabrik AG in Ludwigshafen, (b) Farbenfabriken Bayer AG in Leverkusen, and (c) Farbwerke Hoechst AG, formerly Meister Lucius & Brüning in Frankfurt am Main-Hoechst, May 11, 1955; BASF RA, minutes of the managing board.

cost it a total of DM 45 million: DM 30 million for the acquisition of its agreed stake from the Hüls Holding at a price of 150 percent, and DM 15 million for the later apportionment between the mining companies on the one hand and IG Farben's successors on the other.³²⁰ The unshakable conviction in Ludwigshafen was that the partners meant business. After all, the mining companies had more than altruistic reasons for taking part in the arrangement; the desire to intensify the link to development in chemistry was more important. As for Bayer and Hoechst, the negotiators from BASF had the impression that they were definitely determined to follow any route that led to a stake in Hüls.

It soon became apparent that quick progress toward a big Hüls solution was hampered for "objective" reasons as well. The participating chemical companies could not make the shareholders of the Hüls Holding a realistic offer that would have prompted them to exchange the shares of the Chemieverwaltungs-AG for shares of the three chemical companies at a fixed ratio. None of the discussed exchange offers were both tenable to the chemical companies and sufficiently attractive to the Hüls Holding shareholders at the going market price of Chemieverwaltungs-AG shares.³²¹ An interim solution favored by BASF was not reachable, either. The idea had been to have the successor companies purchase some of the shares in the holding, although they could not exceed the 25 percent limit imposed by the decartelization regulations. To finance the buna plant, the holding would then have granted the successor companies a loan consisting of the proceeds from the sale of the shares. These maneuvers, coupled with a capital increase, would have resulted in a constellation of four equally strong partners (Hibernia, CWH, GBAG's successor firm, and the Hüls Holding), avoiding the problematic division between Hüls AG and Buna GmbH. Wurster would have gladly accepted the obvious outcome of such an interim solution: "If the execution of this design eventually weakens the interest that Hüls AG has in pursuing the buna project, this consequence would only be welcome."³²² When this plan failed, too, the partners had no choice but to content themselves with the "little Hüls solution." In December 1956 they transferred their shares of BWH to the newly formed Synthesekautschuk-Beteiligungs-GmbH (SK) (Synthetic Rubber Company Limited) and thereby at least secured intercorporate tax privilege. The topic of further prospects for the big Hüls solution lingered for many years as a permanent fixture on the agenda of frustrating negotiations between the partners.

³²⁰ Heintzeler to the members of the managing board, regarding Buna Hüls, May 12, 1955; BASF RA, minutes of the managing board.

³²¹ *Geschichte der Rechtsabteilung der BASF. Von der Gründung bis 1967*, Part V (March 28, 1953, through December 31, 1958), p. 25; BASF UA, B 101.

³²² Minutes of the managing board meeting of May 18, 1955; BASF RA.

But the little Hüls solution raised problems as well. The shareholders disagreed whether the plant should be run by CWH as the lessee or rather by BWH under its own management. It took tedious negotiations and a complicated set of agreements before the successor companies won at least a compromise: acceptance of their interest in BWH's relative independence. The main issue for BASF was the chance for a "look at the know-how to be supplied by the licensors."³²³ In addition to the Firestone licensing agreement on polymerization, BASF wanted contracts with the Houdry Process Corporation for the manufacture of butadiene from butane and with Esso Research for the cracking and purification of butadiene. Ludwigshafen also stressed there was no thought of using the German side's know-how, "so the danger that experiences of the successor companies will be passed on to the American licensors in their exchanges with Hüls is not relevant."

Unfortunately, the creation of BWH was accompanied by speculation and dispute about the role of the public sector. BASF had "no misgivings" about a federal guaranty for a loan and would gladly have taken special depreciation in its own balance sheet for the buna works, "given the expectation of their unproductivity for several years." But BASF was strictly against Hüls's plans to accept interest subsidies and overtly similar allowances, especially since such federal payments no doubt ruled each other out.³²⁴ On the grounds of equal treatment, the Ministry of Economics ultimately denied any subsidy, whether outright or hidden. BHW's only recourse was the WDK, which was willing in principle to provide the new buna production with DM 10 million in annual seed money from the equalization fund for four or five years. The successor companies regarded the offer as a two-edged sword, however, because accepting this aid would, for at least a few years, destroy the odds on arriving at a true market price.

The Second Breakup

Against this backdrop, it is no wonder that the original enthusiasm for the Hüls project quickly cooled in Ludwigshafen. Economically, too, the participation proved to be of dubious value. A loss of DM 18 million was posted in the first full fiscal year, 1959, not counting the compensation payments from the WDK, and no profit was in sight for the subsequent years, either.³²⁵ The outlook for the abolishment of turnover tax disappeared, and the slim hope for reimposition of the equalization tax on imported rubber promised only some relief. In answer to skeptical queries from Magener, the head of

³²³ Heintzeler to the members of the managing board, regarding Buna Hüls, May 12, 1955; BASF RA, minutes of the managing board.

³²⁴ Ibid. ³²⁵ Minutes of the managing board meeting of May 4, 1959; BASF RA.

the research department, Adolf Steinhofer, conceded in February 1962 that “no technical experience of significance is coming back to us from BWH at this time.” Nor was anything important to production or applied technology apt to be gleaned from new licenses, for such information was protected by secrecy clauses. Timm did note “a considerable payout” but immediately questioned its sustainability because the sales proceeds for styrene-butadiene rubber were declining, and stereospecific rubber (cis-polybutadiene) was becoming a serious competitor.³²⁶

BASF’s experts also feared that BWH would be undermined if Bayer and CWH together followed through on evident plans to set up a parallel enterprise for the production of cis-polybutadiene. As Ludwigshafen saw it, the situation was complicated still further by the fact that BASF itself had a patent pending for a process of stereospecific polymerization independent of processes developed by Karl Ziegler and Giulio Natta, and it was particularly important in impact-resistant styrene-butadiene compound polymerization. The fear was that the partners would call on BASF not to use this patent against BWH interests. “Any restriction in this direction, no matter how minor, can interfere with our own interests in the area of polystyrene and is therefore untenable business policy.”³²⁷ Moreover, the agreement on principles that had been concluded on May 23, 1955, was due for revision at the end of 1962 – as stipulated in a supplementary understanding arrived at when BWH was founded – if the partners did not jointly control CWH as foreseen by that time. In early 1962 BASF developed a strategy for finding a way out of the tangle. BASF would appeal to the fairness of the BWH partners and argue for creating a joint company in order to build a position that would enable BASF, if necessary, to sell its BWH stake to the other partners at the best price to be had. Only the fear that a withdrawal from the BWH complex might be publicly held against BASF kept the managing board from making a final decision at this time.³²⁸

With these circumstances prevailing, Deutsche Bank made BASF an offer in April 1962: a block of shares in Chemieverwaltungs-AG with a nominal value of DM 20 million from the lumber merchant and stock market speculator Hermann D. Krages and DM 10 million from the portfolio of Dresdner Bank. The deal would enable BASF to acquire a 24.5 percent stake in the Hüls Holding and hence a 12.5 percent stake in CWH at a market value of DM 138 million. The way that Magener presented the opportunity to the managing board members rendered it ineffective for changing the precautionary decision they had just made to disengage from Hüls sooner or later. Basing his figures on the previous year’s dividend and rounding up to an inter-corporate stockholding, the head of corporate finance said that the effective interest yield on the investment would be 2.6 percent, “that is, less than on a

³²⁶ Minutes of the managing board meeting of February 19, 1962; BASF RA.

³²⁷ Ibid. ³²⁸ Ibid.

fixed-term deposit for six months.”³²⁹ Participating in Chemieverwaltungs-AG had no merit whatever as far as financial return was concerned.

According to Magener, other aspects also spoke against the prospective acquisition. Neither the production program of CWH nor its range of products for sale led one to think the company could earn higher returns than BASF did. Quite the contrary, both profitability and the probability of growth were “rather lower than ours.” Participation in CWH did not have much to recommend it from the standpoint of market strategy, either, for the company seemed appropriate for neither forward integration (i.e., producing goods for the end consumer) nor backward integration (i.e., producing its own raw materials). Above all, however, a stake of 12.5 percent did not afford BASF genuine influence on the enterprise, especially since the agreement on principles permitted acquisitions only if they benefited all of the trust’s successor companies. Whoever wanted to abide by the agreed rules could have no interest in acquiring the Krages block of shares – one more reason for BASF to politely decline the offer from Deutsche Bank. Hoechst Dyeworks manifestly thought otherwise shortly after BASF had passed up this opening. “In touch with Hoechst” in the summer of 1962, Dresdner Bank acquired the Krages block without indicating recognizable inclination to allow participation by the partners to the agreement on principles.³³⁰

Movement on the Hüls project came from a different side one year later. The Bayer Dye Factories declared their disinterest in jointly controlling CWH. In consort with CWH, they preferred instead to plan a “Stereo GmbH” to manufacture synthetic rubber for tires, a venture that would come under Bayer’s sole ownership and then merge with BWH if a “Hüls solution without Bayer” should come about. Bayer thus clearly opted for concentrating on the rubber business and wanted to leave its partners free hand as for the rest. Wurster thereupon reopened the subject for debate in June 1963 and had Heintzeler prepare a comprehensive dossier on it.³³¹ The report brought home just how long, stony, and costly the path would be just to achieve complete control of the Hüls Holding. Because of laws protecting minority shareholders, the objective of winning total freedom to shape CWH’s business policy would sooner or later necessitate nothing less than a share-for-share exchange offer to the free shareholders of Chemieverwaltungs-AG. According to Heintzeler, that arrangement alone “would, given the earnings situation of CWH, be a considerable burden on

³²⁹ Magener to the members of the managing board, “betr. Chemie-Verwaltungs-AG,” April 16, 1962; BASF RA, minutes of the managing board.

³³⁰ Minutes of the managing board meeting of June 26, 1963; BASF RA.

³³¹ Heintzeler to Wurster [file copy] to the members of the managing board, “Aktennotiz betreffend mögliche Stufen und Formen der Einflußnahme von BASF auf CWH,” June 24, 1963, attachment 1 to the minutes of the managing board meeting of June 26, 1963; BASF RA.

the trust's successor companies" and would most probably not suffice even to motivate "all shareholders to avail themselves of the exchange offer if possible." Even if it did suffice, BASF would still not be anywhere near controlling CWH. On the contrary, "With a 50:50 company, a clever managing board that understands how to play the two partner groups against each other is the master." Before the chemical companies were free to exert control over CWH, an understanding had to be reached with the mining companies. It, too, would probably carry a high price. The mining industry, in its own interest, could hardly agree to a corresponding shareholder's transaction with the chemical companies without the guarantee of dividends equivalent to the average of those distributed by the successor companies and without a guarantee of its continued financial health, whose valuation was bound "to encounter nearly intractable practical difficulties." These complications were plainly an excessive price for "control" that had to be shared with one or both of the trust's successor companies and that therefore remained "very problematic." It was purely rhetorical to ask "whether the expense of acquiring the mining stake in CWH was worth it under these conditions."

But what about the "special case" that would arise "if Chemieverwaltung[s-AG] were to be taken over by BASF *alone*?"³³² Heintzeler's report first pointed to "probably insuperable difficulties." Although "annual profit-pooling between BASF and CWH" could substitute for guarantees of dividends and assets, that approach would entail "complete disclosure [*Decouvrierung*] for the two pool partners" and give the mining companies "a look into the intimate details of BASF" – something scarcely imaginable for Ludwigshafen. Nonetheless, the managing board felt it was "conceivable" for "BASF to offer the Auguste Victoria mine to the mining companies as part of an overall transaction and, if that is not enough, perhaps also the Marl power plant." Such high stakes seemed necessary, however, because "the very considerable expense" that BASF would have to incur to acquire Chemieverwaltungs-AG alone would not be worth "half a deal."

Heintzeler's dossier then came to a somewhat surprising conclusion. He wrote: "It [the expense] is justified only, and in that case brilliantly, if it is the upbeat to the final solution of making CWH a 100 percent BASF subsidiary and hence BASF's second largest chemical plant." At the end of the debate, the managing board went for this solution, which Wurster preferred, but was aware that Hoechst had to be informed very cautiously so that it was not shocked into moving on Bayer.³³³ There was desire to send Hoechst a signal of "BASF's basic willingness" to sell it the Cassella stake "as part of the so-called second breakup of the trust" if Hoechst offered a fitting consideration. Ludwigshafen's notion of this quid pro quo did not include acceptance of two-party control over CWH by means of the Krages block of shares held by

³³² Ibid. Emphasis in the original.

³³³ Minutes of the managing board meeting of June 26, 1963; BASF RA.

Hoechst and Dresdner Bank. The 1955 agreement on principles was believed to entitle BASF to shared control in any case.

In the managing board's opinion, Bayer's disinterest in CWH, the response making this strategy workable in the first place, was likewise worth certain sacrifices by BASF. It consented to selling to Bayer the BWH stake in the Synthesekautschuk-Beteiligungs-GmbH (SK) along with the corresponding BWH stake in the Hoechst Dyeworks. The board also wanted to agree to the joint venture of Bayer and CWH in synthetic rubber and accept the later merger between the planned Stereo GmbH and BWH. BASF wished only to ensure that it retained full freedom of action no matter what in the area of synthetic rubber outside the field of tires. Since June 1962 BASF had thus completely reversed its stance on the Hüls issue. No longer intent on unloading its BWH stake at the best possible price, BASF was now doing everything it could to gain sole control over CWH in order to solve one of the greatest problems looming ever more clearly after 10 years of expansion. The company had to develop a new site for its broadly integrated production program, and it had to be outside Ludwigshafen, which was bursting at the seams.

Initial contact with Hoechst in August, during which this cat was not yet let out of the bag, aroused Heintzeler's suspicion that Hoechst and Dresdner Bank had a collusive agreement about the Chemieverwaltungs-AG shares, a stacked deck with which Hoechst was endeavoring to end up with a degree of influence over CWH that was incompatible with parity with BASF.³³⁴ Eager to fight, the BASF managing board again came out for exercising sole control over Chemieverwaltungs-AG. Magener was the only person to point out that the returns on the capital outlay for attaining influence on CWH would definitely be considerably lower than the returns that BASF could reap if it "put the same sum of money into its own promising production." The managing board did not follow his lead. It felt the return on investment to be an important, but not the deciding, factor in the judgment about the CWH complex. Imponderables from the IG Farben past came into play when Wurster and Timm reminded their colleagues that the advantages for Hoechst and the disadvantages for BASF from a Hoechst takeover of Chemieverwaltungs-AG could in future be incalculable but were nonetheless of serious import. The managing board also considered whether it was acceptable "that BASF – instead of Hoechst – assumes sole control over Cassella, leaving the Chemieverwaltung to Hoechst alone." The board members concluded, though, that control over Cassella could not be considered of the same value and therefore should not even be discussed.

After a series of bilateral talks that also involved Dresdner Bank, which was obviously far more than a "silent partner" in the great game of the second breakup, Ludwigshafen had no further doubt in early 1964: "Hoechst does

³³⁴ Minutes of the managing board meeting of August 5, 1963; BASF RA.

not want to leave the CWH participation to BASF alone.”³³⁵ Whereas Bayer was still prepared to pull out of CWH, Hoechst was willing only “to concede BASF a somewhat greater internal influence, with BASF and Hoechst formally having equal footing in the Chemieverwaltungs-AG.” Ludwigshafen gave a clear, but refractory, response. The offer contained neither entrepreneurial compensation for withdrawing from Cassella nor the “simple solutions” desired from consolidation among IG Farben’s successors. Wurster was now supposed to “make unmistakably clear” to the head of Hoechst, Karl Winnacker, that “the second breakup was not feasible” on Frankfurt’s terms. Things would then have to stay as they were, and the attempt to implement the 1955 agreement on principles would have to start over.

The course for divestment had already been set for a long time, however, and the days when the corporate policies of the Big Three reflected common elements had ended once and for all. Winking among themselves, the successors of the Farben trust had coined the term “second breakup” for the “little breakup” of Cassella, in which they all three held equal interests amounting to about 75 percent. Things had gone poorly at Cassella since 1958 because it was no longer very innovative. Lacking clear rights of disposal over the assets of this erstwhile “jewel” among the trust’s core companies, Bayer, Hoechst, and BASF had evidently blocked each other in managing the enterprise. No one wanted to take the initiative of “bringing in productions or new developments at Cassella,” partly because of “understandable mutual mistrust.”³³⁶ Although Cassella had positioned itself successfully for the pharmaceutical business upon acquiring Riedel-de Haen, plans to create a sizable research group in that area were rejected by the supervisory board.³³⁷ How to give Cassella a second leg to stand on remained an open topic. None of the successor companies wanted to take the bull by the horns and buy up the remaining shares. Discussions of “whether one could lower Cassella’s market price by distributing a lower dividend and then increase the majority for the trust’s successor companies by purchasing shares” went nowhere.

It was only a matter of time before a “little breakup” was tried as a solution. When it did come – after failure of the “big Hüls solution” – it had to be integrated into an extensive operation designed to unknot the capital links created since 1952. The result was the second breakup of IG Farben. It was a long learning process before BASF realized that it would not be among the winners of this game and that the importance of the playing field was shrinking. The game itself, though, still intensely fascinated the diverging partners. Bayer focused on the buna business and was setting about to capture control and, finally, ownership of BWH. Hoechst had jumped at the chance to buy the Krages block of shares in Chemieverwaltungs-AG when it was offered

³³⁵ Minutes of the managing board meeting of February 17, 1964; BASF RA.

³³⁶ Minutes of the managing board meeting of October 6, 1958; BASF RA. ³³⁷ Ibid.

on the market. In February 1966 Winnacker therefore regarded the agreement on principles as “meaningless” and was not willing “to grant Bayer and BASF participation in Hoechst’s position with Chemieverwaltung.”³³⁸ From his perspective, such cooperation was out of the question for the very fact that Hoechst did not formally own any shares in Chemieverwaltungs-AG, only “an option on the former Krages block held by Dresdner Bank.” Adroitly playing along, Dresdner Bank declared it wanted “for its own books to remain a shareholder of Chemie-Verwaltungs-AG.”³³⁹ Hoechst thereby had greater leverage than BASF and had a good prospect of taking sole control over CWH sooner or later. All BASF could do was try to prevent “Hoechst from becoming the primary beneficiary of the agreement on principles and ultimately coming by a position with CWH that translates into a significant increase in entrepreneurial potential.”

This objective could not be fruitful even in the medium term, particularly since Magener urged the board to invest every available cent where it could bring in the greatest possible return. That was certainly not CWH. By May 1966, with Timm at the helm only since 1965, the continued existence of the agreement on principles was a standpoint that the BASF managing board adhered to only for external appearances.³⁴⁰ The purpose was to keep Hoechst and Dresdner Bank aware of their “bad conscience,” from which BASF might “someday” derive compensation. This decision came all the easier to Timm because it had meanwhile turned out that GBAG was to transfer its stake in Chemieverwaltungs-AG to Hibernia, the German federal government’s own joint-stock united electricity and mining group (VEBA). It seemed pretty unlikely that Hoechst would succeed in wresting a controlling influence over Hüls with Hibernia as a 50:50 partner. In March 1967 Timm officially informed the supervisory board of Chemieverwaltungs-AG “of BASF’s disinterest in the whole CWH complex.”³⁴¹ At the end of the year, BASF finally sold its 16 2/3 share of BWH’s capital stock, half to the Bayer Dye Factories and half to the Hoechst Dyeworks.

The second breakup was not even remotely concluded by these transactions. The modalities of completing it were intertwined with the quest for new expansion strategies and for ways to ward off “penetration into traditional areas of work,” meaning Bayer’s inroads in polyethylene and Hoechst’s in polystyrene.³⁴² BASF’s chosen means of defense vacillated between the pedagogical “notification of an approach’s unreasonableness”

³³⁸ Minutes of the managing board meeting of February 7, 1966; BASF RA.

³³⁹ Heintzeler to the members of the managing board, “betr. Schreiben der Farbwerke Hoechst vom 30.6.1965”; circular by Dr. Timm of July 6, 1965, Ludwigshafen, July 9, 1965; BASF RA.

³⁴⁰ Minutes of the managing board meeting of May 2, 1966; BASF RA.

³⁴¹ Minutes of the managing board meeting of March 29, 1967; BASF RA.

³⁴² Minutes of the managing board meeting of July 17, 1967; BASF RA.

and the “threat of massive retaliation in areas where Bayer or Hoechst are vulnerable.” When on offense, BASF tended to move away from its traditional areas of work, half the profitability of which was jeopardized by diminishing returns and overcapacity, and to seek out new profitable fields of activity at home and abroad. The second breakup supplied old ammunition and new space for both offense and defense. After selling the stake in BWH, BASF had no essential objections to its complete takeover by Bayer but tried to use the transaction to advance its own interests in a quite different area. Acting quickly in December 1968, Timm had acquired approximately 48 percent of the lacquer manufacturer Herwig-Haarhaus AG (Herbol), while Bayer secured 26 percent of the share capital of another shareholder’s group. BASF was eventually able to expand its stake into a majority holding but had to prevent “Bayer from gaining technical and strategic advantages from its participation in Herbol.”³⁴³ Ludwigshafen was firmly determined “in the Herbol context to pursue a policy that would spoil Bayer’s pleasure in this participation as much as possible” if the Dye Factories were not willing to cede its blocking minority stake to BASF.

A more elegant solution, however, lay in an exchange transaction whose scope was demarcated by the second breakup. Namely, Bayer and Hoechst were heading for consolidation that would have Hoechst cede its stake in Chemieverwaltungs-AG to Bayer in return for Bayer’s control over Cassella. This exchange, however, required BASF’s willingness, for Bayer was obliged to offer half of this block to BASF and half to Hoechst simultaneously.³⁴⁴ The transfer of Cassella to Hoechst was by no means welcome to BASF. “Unpleasant consequences” were expected in the areas of melamine resin and vat dyestuffs if Hoechst were to become “the strongest firm” there.³⁴⁵ Moreover, Ludwigshafen had also had its eye on Cassella and would have liked to appropriate at least its pharmaceutical area “in return for suitable payment.” Neither the free shareholders nor Hoechst was apt to give a green light for such a transaction, though, because “the pharmaceutical business makes up one-third of Cassella’s earnings.”³⁴⁶ BASF’s managing board quickly became aware “that there is absolutely no real chance of achieving the basically worthwhile objective of BASF’s acquiring the Cassella stake from Bayer and Hoechst.”³⁴⁷

³⁴³ Minutes of the managing board meeting of January 15, 1969; BASF RA.

³⁴⁴ Minutes of the managing board meeting of November 19, 1968; BASF RA.

³⁴⁵ Minutes of the managing board meeting of November 18, 1968; BASF RA.

³⁴⁶ Magener to the members of the managing board, “betr. Besprechung mit den Farbwerken BAYER am 31. März 1969 im VB Frankfurt von 12 bis 16 Uhr”; April 1, 1969, attachment 6 to 10/69; BASF RA.

³⁴⁷ Minutes of the managing board meeting of October 6, 1969; BASF RA.

Under these circumstances, giving up a 25 percent stake in a company “whose earnings may decline and necessitate new capital expenditures by the participants” did not seem to be the worst solution. In return, Bayer was willing to give up its blocking minority stake in Herbol if BASF gave a “good behavior” declaration that it did not intend “to buy up the German lacquer industry.” Only small specialized companies and all foreign activities were to be exempt from this understanding.³⁴⁸ Although the managing board in Ludwigshafen had just decided “to enlarge [BASF’s share of the domestic market] considerably in the coming years,” there was “momentarily no cause to actively pursue” the acquisition of additional lacquer companies.³⁴⁹ The declaration of good behavior was not legally binding, anyway. Hence, the road was clear for the second breakup in late 1969 and early 1970. While Bayer and Hoechst were claiming further choice parts from the old IG Farben holdings, BASF at least obtained the ways and means for pursuing new strategies for expansion. The second breakup marked the end of the postwar era for the chief German manufacturers of chemicals, pharmaceuticals, and dyestuffs. Preoccupation with succession of the Farben trust gradually waned with the new generation of CEOs – Kurt Hansen (1961) at Bayer, Bernhard Timm (1965) at BASF, and Rolf Sammet (1969) at Hoechst. They all stood back to back, with each taking aim at new markets mostly outside Germany’s borders.

5. THE WAY TO THE TOP: STRATEGIC DECISIONS

Orientation Problems

In the early 1960s BASF’s managing board would have had ample opportunity to take stock and give itself credit for what had been achieved. Since re-establishment, this successor to the Farben trust had consolidated in every way and had developed into one of the largest and most prosperous West German companies. In the course of 1963 its total sales exceeded DM 3 billion for the first time.³⁵⁰ The international sales net that IG Farbenindustrie had oriented to the interests of the entire group from 1925 to 1945 had been restored and reshaped to meet the needs of BASF. The share of total business accounted for by foreign transactions was progressively approaching 50 percent. Participating in production plants in seven countries in 1962, including the difficult U.S. market, the company was also finding a firm foothold abroad as a manufacturer of chemicals. The labor front

³⁴⁸ Magener to the members of the managing board, “betr. Besprechung mit den Farbwerken BAYER am 31. März 1969 im VB Frankfurt von 12 bis 16 Uhr, 1.4.1969”; April 1, 1969, attachment 6 to 10/69; BASF RA.

³⁴⁹ Minutes of the managing board meeting of January 15, 1969; BASF RA.

³⁵⁰ Minutes of the managing board meeting of December 2, 1963; BASF RA.

remained peaceful, and more and more Anilines identified their own interests with those of the company. Technologically, too, the managing board had done its homework. The Ludwigshafen production facilities were state of the art in almost all areas. Even more important, BASF had made a fundamental switch to a different raw material and in doing so had lived up to its role as a pioneer of West German petrochemistry.

For many reasons, however, the climate in Ludwigshafen in the early 1960s was one of frustration and uncertainty rather than of self-satisfaction and euphoria. In the dispute over the second breakup of the Farben trust, the other "sisters" quickly created their own profile, pursuing clear objectives that BASF could not match for a long time. When the managing board finally did decide on a strategy of expansion, it came too late. The tactical starting positions of the rivals could no longer be shaken, leaving the general impression that BASF had gotten the worst of it in the poker game for the final distribution of the trust's estate. The first smudges appeared on the company's image among its customers. BASF compared unfavorably particularly with American competitors, the complaint being that "certain areas of BASF were not elastic and receptive enough and were unjustifiably inclined to act somewhat like know-it-alls."³⁵¹ Even the performance of BASF stock was constantly puzzling. Although Ludwigshafen was paying a top dividend and although the potential of BASF stock was highly rated by analysts, its price trend usually lagged behind Hoechst's stock, as Magener had to concede.³⁵²

BASF's new head of corporate finance admitted his own bafflement, but endorsed the "view of the banks," which attributed the main cause of the price discrepancy to the fact that BASF is not in the news nearly as much as Hoechst was. This diagnosis surely tallied with Magener's own impression that the BASF of the early 1960s, as he later described, was "an operation dominated by technocrats" and that its public appeal greatly suffered from the atmosphere of "utter provinciality" prevailing in Ludwigshafen.³⁵³ In 1925 BASF went into the IG Farbenindustrie merger as the leading force and had shaped its face for the most part. After 1945 insiders such as the shareholder lobbyist Carl Christian Schmid quite naturally believed BASF had the chance to become "the biggest successor company," and Carl Wurster indisputably enjoyed higher esteem than any other veteran of IG Farben's management did.³⁵⁴ In that context the BASF managing board must have found it galling to rank behind Bayer and Hoechst in prestige and efficiency.

³⁵¹ Minutes of the managing board meeting of November 21, 1960; BASF RA.

³⁵² Minutes of the managing board meeting of February 5, 1962; BASF RA.

³⁵³ Interview with Dr. Rolf Magener on December 3, 1999 in Heidelberg; BASF UA.

³⁵⁴ Schmid to Wurster, "betr. Gründung der Basis-Gesellschaft, Düsseldorf" [re: The founding of the new corporate entity, Düsseldorf], December 22, 1951; BASF UA, C 21; and Schmid to Wurster on November 24, 1952, C 31/1.

Almost all entrepreneurial statistics in the industry put BASF even with or ahead of the other co-affiliates, a status that extensive comparative studies confirmed year after year until 1965.³⁵⁵ But unlike Bayer and Hoechst, BASF had seen its sales volume shrink in 1961 and 1962, and most of the company's strategic benchmarks, such as cash flow, gross returns, and value added, though still comparatively well positioned, were tending to slip. The other companies were catching up. This erosion showed up clearest in the cash flow (the sum of earned depreciation, allocations to the company reserves, and annual net profit). Whereas the contraction in BASF's earnings depressed the net percentages of the company's total output accounted for by these indices, these percentages had risen at the other successor companies from 1962 to 1963.³⁵⁶

BASF analysts further narrowed down the cause for the slump in earnings by comparing the investment co-efficients of the three IG Farben successors. For every DM 1,000 of investment from 1953 through 1962, BASF had raised its turnover by DM 640; Bayer, by DM 760; and Hoechst, by DM 860. In other words, in order to boost turnover by DM 1,000, Bayer needed to invest only 84 percent of what BASF did. The figure was even lower at Hoechst – only 74 percent.³⁵⁷ It was reasonable to suspect that BASF was investing in fewer burgeoning markets than its competitors were. Obviously, BASF had thus far shown no interest in booming fields of business such as synthetic fibers and pharmaceuticals, which were responsible for increasing sales quotas at Bayer and Hoechst. In 1963 those sectors accounted for 31 percent of Hoechst's total turnover. At Bayer products oriented to the final consumer accounted for an even higher percentage of total turnover if the sales in the Agfa photo business were added in.³⁵⁸

The comparison also illuminated BASF's strengths, for the former trust's "shop of raw materials" had a higher share of value added at the finishing stage of production than any of the trust's other successor companies. It generated 66.1 percent of the gross receipts in BASF's total output, a significantly higher level than that at Bayer (57 percent) and Hoechst (55.7 percent).³⁵⁹ BASF was the least material-intensive of the three companies and had the highest value added. Because this value added stemmed from the capacity to use scientifically based processes to transform raw materials, it was an expression of the highly advanced nonmaterial production that had become the foremost paradigm and main shaper of twentieth-century economic

³⁵⁵ One of the last internal studies of this kind is 175 pages long: BASF, Volkswirtschaftliche Abteilung [Department of Political Economy], *Vergleich der kurzfristigen Entwicklung BASF, Bayer, Hoechst* [Comparison of short-term development of BASF, Bayer, and Hoechst], May 1964; BASF UA, B4/981.

³⁵⁶ *Ibid.*, p. 13. ³⁵⁷ *Ibid.*, 1961–2, May 1963, p. 39; BASF UA, B4/980.

³⁵⁸ *Ibid.*, May 1964, p. 50; BASF UA, B4/981. ³⁵⁹ *Ibid.*, pp. 6–7.

development. Going on from there to better the company's competitive position was a second option along with forward integration involving consumer-oriented markets with comparatively vigorous growth. In the early 1960s, the lack of attractive, remunerative products was rather keenly felt when BASF sought reasons for its relatively weak growth and earnings.

Some of the signals from the market also nipped any success-related complacency in the bud. Of course, "no BASF product was without competition,"³⁶⁰ although the company in its heyday had spawned sellers' markets by virtue of its own technological superiority, as after the breakthrough with indigo and nitrogen synthesis. But since the early 1960s, the areas of business constituting most of BASF's turnover – nitrogen and raw materials for plastics – had been hard pressed by falling prices.³⁶¹ Only dyestuffs, which contributed a modest 18 percent of BASF's sales in 1962, were doing well. Worse still, the fall in prices was jeopardizing the company's past recipe for success. By streamlining manufacturing processes, BASF had always managed to produce at comparatively low cost and thereby offset price pressure on buyers' markets; and by offering technologically improved products, the company could still sell profitably in the upper range of the price spectrum. But the sharper competition became and the more it endangered Aweta's margin of superiority, the more precarious BASF's competitive position threatened to turn – unless something decisive happened with the company's corporate strategy. The mounting difficulty of defending the preference for "the more expensive BASF products" under these conditions was experienced by the managing board right in its own backyard when in September 1961 Gewoge felt compelled to request permission to use materials other than BASF's own for housing construction. The housing society cited costs because its "responsibility was to build as economically as possible." In the end BASF assumed the cost difference and cleared them as professional outlays.³⁶²

Problems with internal structure further escalated the pressure on top management to reposition BASF strategically. After the long boom of the 1950s, the company clearly showed traces of rampant growth. Timm described the condition succinctly: "A look at BASF's cost volume reveals a high proportion of service departments, the picture typical of prospering enterprises that have grown slowly."³⁶³ This area was highly personnel-intensive, and it lacked a cost-consciousness because "expenditures are simply passed on." The urgent question, therefore, was whether it would be better "to bring in services from outside if analysis shows it to be more economical to have

³⁶⁰ Minutes of the managing board meeting of February 4, 1963; BASF RA.

³⁶¹ Minutes of the managing board meeting of February 6, 1961; BASF RA; BASF annual report for 1962, p. 14.

³⁶² Minutes of the managing board meeting of July 3, 1961, and September 11, 1961; BASF RA.

³⁶³ Minutes of the managing board meeting of January 22, 1962; BASF RA.

third parties perform them." Outsourcing alone could not solve the organizational problems of BASF, however. As early as the fall of 1960 there was agreement that the company had reached a scale for which its organizational forms were no longer adequate.³⁶⁴ Fundamental corporate restructuring was considered necessary, with decentralization and focusing being especially important. This thinking caused unease for much of 1962 and absorbed a good deal of the management's energy and attention, not to mention the board's. The climate of plant social policy and the spirit of the social partnership between labor and management also changed in the early 1960s. The unions adopted a confrontational wage policy intended to shift the internal distribution of wages and profits in their favor. At the same time, the question of relocating the company arose because the day was nearing when neither the traditional site nor its labor market would be able to cope with the high demands that future investments were going to entail.³⁶⁵ Environmental problems, too, had surfaced since the early 1960s. BASF had hit the limits of its ability to dispose of industrial wastewater, and environmental protectionists were complaining more and more frequently about the pollution of the Rhine River, which had killed masses of fish.³⁶⁶ The human population was suffering ever more from air pollution. What the people had tolerated during reconstruction and the economic miracle, when fume-belching smokestacks were justifiably associated with growth and prosperity, now became a nuisance to the public and the decision-making community, both of which set out to enhance air quality.

The damage to BASF's image, the problems with the company's internal structures and policies, and the objective limits to further additions at the Ludwigshafen site coalesced in the early 1960s to force the managing board into serious thinking about new corporate strategies that could lay the foundations for a fresh post-reconstruction phase for the company. The new strategy was able to tie into some of the triumphs scored up to that time, such as the cautious expansion at foreign production sites since the 1950s. BASF's sophisticated research, efficient technology, and attractive applied technology could be turned to good account, particularly since the shift from coal-based to petrochemical production had opened the way to future competitiveness. BASF was least prepared for new approaches stressing the management of costs, earnings, and profits, not technological visions. These new directions cast no doubt on the significance that either research or other nonmaterial production factors had for the value added by the chemical industry. On the contrary, the more science and knowledge permeated the overall economy as a factor of production beyond the new industries, the less dispensable this research and other intangible factors of production became

³⁶⁴ Minutes of the managing board meeting of November 21, 1960; BASF RA.

³⁶⁵ Minutes of the managing board meeting of September 11, 1961; BASF RA.

³⁶⁶ Minutes of the managing board meeting of May 2, 1960; BASF RA.

as parameters of economic success. However, epochal innovations in chemistry and technology did lose their function as paradigms of development in the sector, especially since they stood out less and less in the accelerating pace of innovation. They were supplanted by visions of business management such as growth, returns, and stability, whose priority over technological ends continued to grow in Germany and elsewhere.

If the link between corporate culture and the highly successful old vision had thus far been closer at BASF than at the other German chemical corporations, BASF now had to go much further than they to adapt to the new culture emerging in the sector and to capitalize on its comparative institutional cost advantages in the new environment. BASF research department would not have been in any position at all to prescribe or propose targets for management planning in the medium term. During strategy discussions, Adolf Steinhofer felt able only to look "somewhat" ahead one or two years. He regarded it as "hardly possible" to make confident predictions beyond that.³⁶⁷ This turning point in corporate strategy was facilitated by the impending transition from Wurster to Timm at the top and by the fact that the managing board had gained an ambitious head of finance with worldwide experience – Magener – in early 1962.³⁶⁸

This context produced two important decisions destined to have a long-term impact on the company's course. First, in February 1963 the managing board accepted, albeit rather unenthusiastically, Magener's concept of profit planning, which imposed the primacy of business administration on BASF's corporate culture dominated by chemists and technicians, who had shown relatively little concern for economic principles up to this point. Second, just six months later Timm persuaded his colleagues to accept a new technical paradigm that exploited BASF's strengths in this area even without epochal major projects. It was the fully integrated chemical production complex, a dense network of interconnected production plants in which the by-product from one plant often serves as the basis for production in another (the ver-bund system).

Profit Can Be Planned, or the Will to Greatness

By recommending that earnings be put at the center of financial planning at BASF, Magener entered completely new territory on the managing board in more than one respect. The substance and style of his presentation differed

³⁶⁷ Minutes of the managing board meeting of February 4, 1963; BASF RA.

³⁶⁸ Until joining BASF's banking department, Magener was in foreign trade, with his last posting being in London. As a representative of IG Farben in Bombay, India, during World War II, he was detained by the British in the Himalayas. He escaped, however, and made his way by train and foot behind Japanese lines to Burma, from where the Japanese flew him to Tokyo. See Magener, *Chance*.

starkly from the reports usually heard there. No one since the refounding had explicitly set the company's sights so high, and no one had yet used the managing board as the forum for an argument loaded with so much personal commitment and willingness to take risks. It would be wrong to assume, however, that Magener would have embarked on this foray without the prior agreement of the managing board chairman, much less against his will. Nothing indicates that this proposal lacked Wurster's approval before it was put on the board's agenda. Indeed, Wurster had thoroughly familiarized himself with Magener's ideas, and the matter's enormous importance strongly suggests that the chairman himself expressly encouraged his relatively young colleague to seek the managing board's blessing for his ideas in order to embed them in corporate policy. When it came to financial expertise itself, however, Magener did not depend on cover from the company's top two figures. Since entering BASF's banking department, he had consistently put economic principles before the rationale of technological visions, an objective that had long been standard outside Germany. His very appointment as head of the finance department had already set a precedent.

Magener started with a surprise. "*The goal of BASF*," he declared, "*is to put itself at the forefront of this industry*."³⁶⁹ Reiterating this call in many different ways, he made it the leitmotif of his address. In plain terms, it meant "outmatching Bayer's profit-making power as quickly as possible." Was this just "starry-eyed profit worship"? Did "something staggeringly new" lie in this pronouncement? Magener was persuaded of his strategy's feasibility because he only had "to raise awareness" and "methodically organize" what BASF had instinctively been attempting for a long time. He assumed "that we have the requisite material and personnel to go to the top of our industry" and that all BASF still needed was the very conscious resolve and the procedure to act on the plan. BASF had thus far oriented its profit mark "retrospectively as it were" – to the most recently paid dividend. Magener intended now "to step out more boldly and quite consciously *train our company to generate a rising level of returns* while systematically bearing factors of the future in mind." His diagnosis of the sources for future betterment of profit was simple, but pertinent. Economizing and improvements in processes, he explained, were barely enough to offset the steady decline in earnings and hikes in wages and salaries. "Until further notice, *only an expansion of business* can increase earnings." It was thus necessary to manage it in such a way "*that it makes a defined contribution to the production of future profit*."

A "mental model" with hard-and-fast BASF numbers illustrated how BASF could work its way up to first place in the German chemical industry. If profits and the proportion of self-financing mounted steadily, getting

³⁶⁹ Magener, "Ertragsplanung," February 4, 1963, attachment 1 to 3/63, emphasis in the original; BASF RA.

there would require a pretax profit of DM 500 million, "better yet, DM 550 million." The share of financing from BASF's own resources had climbed to nearly 40 percent in 1960, about equivalent to American levels. In 1961 the figure was zero, and only 25 percent in 1962. In 1960 BASF had earned DM 400 million, whereas Bayer had reached DM 500 million in its record year. The aim, which Magener considered "reasonably achievable" within three years, was therefore to push up profit from 25 to 38 percent – and that for the "BASF parent company," not the group as a whole.

From there on, the mental game was simple. With a turnover of DM 2.9 billion and a profit of DM 400 million, a 14 percent return on sales was made in 1962. In order to make DM 500 (or 550) million at a 14 percent return in the future, a turnover of DM 3.6 (or 3.9) billion would be necessary. Within three years, turnover would thus have to go up by DM 700 million (or DM 1 billion) to make the profit that was sought. In other words, annual turnover had to swell at least 8 percent in comparison to the results of 1962. If the sales volume remained the same, then, according to Magener's figures, a 17 percent (or more than 19 percent) return on sales would be necessary to hit the earnings target. Returns of that magnitude, however, had thus far been attained only in the United States, where DuPont held the record of 23 percent. In the German chemical industry they seemed unrealistic for the time being, but it did seem manageable to lift annual turnover by 8 percent.

Magener saw the road to that aspiration nowhere other than in expansion of BASF's own plants and through additional investment in subsidiaries and associated companies. Magener believed that this action, "which we can deliberately set in motion," was the vehicle "with which we can control our profit creation by enlarging turnover." Assuming plant growth of DM 2.6 billion and extra sales of DM 2 billion, he calculated a capital output ratio of 1.3 for BASF's investments over the previous 10 years. In other words, there had to be DM 1.30 in fixed capital formation for every West German mark of additional turnover. According to these numbers, reaching the stated level of DM 700 million in turnover would have necessitated investments of approximately DM 950 million. Distributed across three years, that figure was quite normal for BASF.

From this point in the thinking, one needed only to round out the mental model with ideas for financing the plan. Given depreciation of DM 650 million, a net investment of DM 300 million corresponded to a gross investment of DM 950 million. Because accounts receivable and inventories grow proportionally with turnover, DM 200 million were added for the increase in current assets, making a total of DM 500 million to finance. According to the golden rule of finance – two-thirds self-financing, one-third outside financing – DM 60 to 70 million for fixed capital was required from the taxed general revenue fund. The rest had to be raised by issuing the authorized capital at a subscription price of at least 200 percent, "although the general revenue fund ought to be almost enough for pure self-financing."

Table IV.3. *Additional Turnover Required by BASF in 1965 (in Millions of DM)*

Line of Business	Target	Prediction
Dyestuffs	130	100
Agriculture	180	50
Chemicals	350	300
Other	40	0

The increase in current assets could be covered “effortlessly” with external funds, though. Magener’s conclusion was that “at the end of three years we will have a balance sheet with a bottom line of [DM] 3.5 billion and a 14 percent return on investment.”

Admittedly, the model rested on numerous assumptions that made its application to BASF practice appear problematic. This was true, in Magener’s eyes, at least for the assumption that the percentage return on sales could be maintained over the next three years. Nevertheless, BASF’s production costs in relation to turnover had remained relatively stable for years because continual advances in processes did in fact cushion escalations in costs and declines in prices. Success thus depended entirely on new business, which in three years also had to make up for approximately DM 100 million of traditional turnover “that was steadily dying off.” Pointing to the returns on BASF’s various fields of turnover, Magener demonstrated that even “a mechanistic extrapolation” of 1962 conditions for 1965 made the intended outcome likely: DM 500 million with a 14 percent return on sales. He did not want to content himself with mere replication, however. He aimed “to heed the profit-making principle of *ignoring* all areas lying *below* the average yield and supporting those lying above it.” To do so at BASF would have required the interests of the fertilizer division and of other business to be transferred to dyestuffs and chemicals, which were more profitable. Far more dubious in this context was the assumption “that our investment potential really does suffice to bring about the desired gain in turnover [and to do it] in the ideal distribution.” In Magener’s projection for 1965, which referenced the conditions at BASF in 1962, the levels of turnover that were shown to be necessary in the different sales areas were preposterous according to the forecast by the central office (see Table IV.3).

To make ends meet, however, “the missing quarter of a billion in turnover would still have to be created.”³⁷⁰ To Magener, this “gap” was no reason to give up on his model. On the contrary, identification of the hole finally furnished a specific standard to measure up to within three years “through

³⁷⁰ Ibid.

new research results, the purchase of shareholdings, the sale of licenses, [and] unexpected market needs for old products." Plainly, there were also certain side effects that could not be taken lightly. First, the new strategy created pressure to have research, investment, and sales revolve around an earnings objective, "with the advantage that it will tie the company more closely to the future and sharpen the focus of managerial decision making." Second, investments henceforth had to meet certain "imposed" performance criteria, and the programs had to be geared to promoting the company's constant growth. Third, the "white patches in the picture of future turnover" posed a "clearly defined task for research in particular to create future turnover by means of innovation and for the company's management to fill any remaining gaps by means of shareholding acquisitions." Moreover, Magener found the model useful for improving detection of the company's weak points, and his examples revealed where he suspected they lay. For instance, if long-term rises in earnings looked hopeless, he wanted to know "whether BASF was perhaps not risking enough in its research, [whether] our technological daring is perhaps too slight." Lastly, long-term financial planning should also "spur haste" where "we are not coming out with new products quickly enough to collect the full bonus of novelty."

Magener was well aware of other assumptions implicitly underlying the model and, hence, the proposed strategy, but he felt them to be them irrelevant. Higher taxes would reduce the proportion of self-financing but would affect all competitors, too, "leaving our relative position unaltered."³⁷¹ The same would be true for the effects of fluctuations in the business cycle. Even if the competitors "begin running faster," that is, if they starting entertaining the same thoughts, it "might rob [BASF] of the chance to get to the top rapidly but would be a sound reason for us to try; otherwise, the existing margin would only widen." Magener concluded by appealing to shared experience with the vicissitudes of the chemistry business. "The status quo affords no security in chemistry." If that is the case, and if "one still has to worry about next year's results and those of the following years" even after a winning year like 1962, "then it is better to accept change as a normal factor right from the start and base our future plan of action on this insight." As "primitive" as the proposed strategy is, its very simplicity and plausibility is captivating: "No one aspect puts undue demand on another. The investments can produce turnover; turnover can produce earnings; and the whole is easily financeable." All the values, relations, and planning horizons had previously existed: "They are not figments of imagination." In the final analysis, the difference between treading the old path and deciding to follow the new one lay in the size of the next step to be taken: setting the earnings target for 1963. "If we think of it as in isolation for one year because the

³⁷¹ Ibid.

long-term program can begin later, I argue for [DM] 400 million. Otherwise, it would have to be [DM] 425 to 430 million.”³⁷²

After lengthy discussion, the managing board set its sights on gross pretax earnings of DM 425 million for 1963.³⁷³ Wurster had Magener, Timm, Hans Freiensehner (the head of sales), and Steinhofer meet jointly with the division directors, sales directors, and research directors to discuss the new strategy in order to “derive specific tasks for the individual lines of business.” The exchange of views brought forth no discernible alternative to Magener’s suggestion but did reveal its vulnerable flanks. One of them especially stressed by Freiensehner was the need to enhance quality. There were few areas in which BASF had dared advance into the market for final consumers. The new forward strategy was soon likely to entail a fundamental decision that was bound to break with BASF’s past principles in this regard. Experience over the years was not encouraging. Freiensehner’s fleeting observation “that BASF still had not come up with a suitable videotape and computer tape” was all that was needed to remind everyone of how stony the road in this new direction could be. Even more crucial for the fruition of Magener’s future-oriented profit planning were the dynamics of turnover at BASF AG, the parent company. Past experience had taught not to expect the associated companies to contribute much to earnings, “partly because they did not yield significant returns and partly because they needed their earnings for their own investments.” But their weak contribution was precisely what the new strategy was supposed to redress. “Gaps” in the parent company’s program were to be closed through selective acquisition. Having temporized for several years, Magener now belatedly stated his economic rationale for BASF’s course of expansion, which in his opinion had been serving only to compensate for a deep-seated inferiority complex. What had been started as a therapy to help BASF dispel its entrenched public image as a “weary shop of raw materials” was now to be continued – but more systematically and intensely as the ultimate rationale of the new corporate strategy.³⁷⁴

Interlocking Production Operations on a Large Scale, or a New Technological Paradigm

In August 1963, only a few months after Magener’s presentation, Timm, too, attempted a major success in his effort to end the lack of orientation at the BASF of the early 1960s.³⁷⁵ He had been occupied for some time by the question of how BASF could preserve the comparative quality or cost

³⁷² Ibid. ³⁷³ Minutes of the managing board meeting of February 4, 1963; BASF RA.

³⁷⁴ Interview with Dr. Rolf Magener on December 3, 1999 in Heidelberg; BASF UA.

³⁷⁵ Report by Timm on the division directors investment meetings of June 4, June 18, July 16, and July 23, 1963, attachment 1 to the minutes of the managing board meeting of August 5, 1963; BASF RA.

advantages that had continually afforded it a long lead over its rivals. Timm believed this traditional edge to be jeopardized, particularly by American competitors, who had dramatically improved the quality of their products and had extensively adopted the German chemical industry's classical recipes for applied technology. He saw similar issues looming on the cost side as well. "What," he asked, "is our special position if all our competitors use fractions distilled from crude oil for their nitrogen and maybe even apply the same experiences of Shell, Texaco, and other companies to do so?"

His answer was far less spectacular than Magener's vision that BASF could ensconce itself at the top of the industry through the sheer will to greatness. But it was no less effective, and the results now characterize the company at all its locations. Timm thoroughly realized what his response meant when he emphasized "that in concurring with the present plans, we are taking decisions that will reach far into the future." In a nutshell, the new strategy he proposed as the deputy chairman responsible for production came down to the conviction that "our advantage is in fact to be seen in the giant interlocking production system, if we can design it to be flexible in the right way." Timm wanted to divest the existing network of all "elements" that rendered it intractable and to effectively combine all processes really suited to creating "an even bigger network that would achieve an operational optimum more propitious than our present situation." According to his preliminary calculations, this vision was possible.

Unlike Magener, Timm did not go in for showy presentations. He hid his new plans in a lengthy, dry report about pending investments "whose overall relation to the company's general investment policy may not be evident." The trends of heavy investment were indeed unmistakable. Just under DM 100 million were earmarked exclusively for a 50 percent expansion in the area of fiber raw materials, that is, in the capacity of the monomers caprolactam and AH salt, which served as intermediates in the manufacture of polyamide (nylon-6 and nylon-6,6) filaments and fibers for textiles made of nylon and perlon. The faith Timm had in the future of nylon had been unshakable ever since he had "nylonized" himself during his visit to New York in December 1949 in order to learn the wearability properties of the new material.³⁷⁶

The investment project made its way through three departments. The first was the one for intermediates, with the oxidation of cyclohexane and the manufacture of dinitrile for caprolactam and AH salt (nylon precursors). Then came the department of fiber raw materials, with the actual final stage of caprolactam and AH salt. Lastly, and indirectly linked to the department of fiber raw materials, there was the nitrogen department, with the increase

³⁷⁶ He had bought two nylon shirts, underwear, stockings, and a red tie for \$50 and found everything "pleasant" to wear, though the experimental conditions – with "temperatures around 0° C [32° F]" – were anything but favorable for briefs. Diary of the First Trip to America, late November 1949, Sunday, December 3, 1949; PAT.

in hydroxylamine production (an auxiliary component of nylon production). Getting around the difficulty it caused in the combustion of ammonia and the absorption of nitric acid also incurred financial costs. At the same time, BASF invested another DM 20 million in the production of ultramids (a polycondensation product of AH salt and polycaprolactam) for the plastics area. Preparations were also made for boosting BASF's capacity to produce dimethyl terephthalic acid, which served the polyester-based manufacture of filaments and fibers for textiles of all kinds (e.g., diolen). Given the dimensions of the whole project, it seemed necessary to appoint a project leader to ensure the smooth interaction of the numerous participating departments at the decisive moment.

Yet another new aspect of the investment policy was the construction of the petrochemical acetylene plant, which involved DM 70 million. It was scheduled to begin operation in 1964 and was expected to produce a vast amount of synthesis gas so that BASF could dispense with delivery of coke from the Auguste Victoria mine as of 1965 or 1966. The BASF mine was able to compensate for the closure of its coking plant partly by delivering low-grade coal to BASF's new power plant in Marl. Timm enthused over this result of Wurster's clear energy plan because the plan, in turn, perfectly fit the proposed concept for BASF's raw materials without the company prematurely having to sever its last link to coal.³⁷⁷ This final mental reservation notwithstanding, the principle was established once and for all: "Oil is our chemical raw material; coal and oil are the two raw materials for our energy supply." When it came to the new raw material, of course, BASF could not now let the oil companies insist on the expensive transport by seagoing vessels and Rhine River barges. Timm urged that "we arrange a quota for transport through the pipeline system from Marseilles to Mannheim."

BASF's ethylene-supply project, whose initial expansion cost DM 65 million, was a further step in erecting a unique, integrated production system. Among other things, it was necessary to continue growing in the area of polystyrene and building a "switchyard" for flexible engagement on dynamic markets. But the project engendered new needs as well. Instead of simply wasting the inevitable by-products of cracking, such as propylene, the company sought chemical uses for them. The plastics laboratory had to figure out new applications for other by-products, too, such as butadiene, vast amounts of which resulted from BASF's processes. The network of projects spanning three of BASF's production divisions (I-III) cut the production costs per kilogram of ethylene (to less than DM 0.30), butadiene (to DM 0.50), acetylene (to DM 0.55), vinyl chloride (to less than DM 0.40), and polyethylene (to between DM 0.80 and 1.00) – all important interim

³⁷⁷ Report by Timm on the division directors' investment meetings of June 4, June 18, July 16, and July 23, 1963, attachment 1 to the minutes of the managing board meeting of August 5, 1963; BASF RA.

stations in the switchyard for the manufacture of basic chemical elements. These levels encouraged Timm to proceed aggressively on all fronts of BASF's plastics program while considerably expanding the volume. The sales prices for a kilogram of polyethylene in the same year ranged from DM 2.52 (for low-pressure Lupolen) to DM 1.67 (for Lupolen H). At the time of Timm's report, the prices of the other primary products for plastics were about four times their production costs.³⁷⁸ With an annual turnover of approximately 100,000 tons of Lupolen, BASF did good business with the product as early as 1963. Above all, though, Timm could demonstrate "that our plastics production – depending as it does on only a few raw materials, mostly acetylene, ethylene, synthesis gas, and chlorine – has meanwhile already taken on such vast proportions that a new kind of interlocking operational configuration has emerged within it, [a system] that is tightly meshed with the plant network as it actually used to exist only at the Oppau works." This new fully integrated production complex had spread to the entire works and had generated much more than 50 percent of the turnover. Be that as it may, the "great leap forward" that was to take BASF in Ludwigshafen still further toward becoming "a very large plastics manufacturer" lay in the future. Timm was convinced "that it [could] account for about three-quarters of our Ludwigshafen turnover."

Timm certainly did not wish the importance of the classical chemistry of intermediates, coloring aids, and dyestuffs at BASF to be ignored because of the focus on plastics. Although he forecast that the percentage of sales accounted for by the former three fields would continue to shrink, that decline did not have to mean that their contribution to the company's earnings were going to stagnate in absolute terms. Timm argued instead for them "to maintain an appropriate absolute level of turnover" – first, because he wanted to spread the risk and, second, because he did not want the developmental potential there to be neglected "beside the modern continuous processes and the surge in process technology." He pursued the same objective in the area of modern organic chemistry, which he brought into his plans under the heading "vitamin synthesis" to avoid overlooking its future as an important line of business. In classical chemistry, of all fields, BASF was "still laboring under certain ties to IG Farbenindustrie's distant past that signify an especially tight constraint for Ludwigshafen." Given the conflict with Hoechst over the "second breakup," Timm now saw the time had come to end such deference and begin seeking to promote similar dynamics in this field.

Timm's sizable, interlocking, cooperative operational system meant nothing more and nothing less than the creation of a new technological paradigm for BASF. Marshaling the human and material resources of several

³⁷⁸ Freiensehner, *Jahresbericht 1963 des Verkaufs* [Annual Sales Report for 1963], pp. 27–8; BASF UA, T 002/8.

companies, the verbund system permitted BASF to make the most of its indisputable competitive edge in technology. Besides the obvious cost advantages bestowed by this system, it also enabled BASF to adapt flexibly to changing market opportunities. This characteristic dovetailed perfectly with Magener's profit planning, which required BASF “to market products that the whole world craves” in order to perpetuate the company's growth. “Stimulated that way, demand would be willing to pay high prices and would not follow cyclical fluctuations in quantity.”³⁷⁹

This vision, which bordered almost on hubris with Magener, arose from the desire to end the “useless race” on product markets subject to cyclical fluctuations and price pressure. Timm's vision of a gigantic, interlocking switchyard functioning with clockwork precision in the field of chemistry seemed to put this goal within reach. The new paradigm did not replace the necessity of preserving and nurturing the ability to offer customized quality production. Sales continued to be governed by the principle “that the areas where scientific and developmental achievement still count hold up best in competition.”³⁸⁰ By contrast, the prices of commodities “simply [had to] yield to competitors who were often quite primitive.” The new technological paradigm enabled BASF to retain its share even of those markets, as shown by its track record with Lupolen, polystyrene, Styropor, ethylene oxide secondary products, softeners, and kaurit glue. To some extent, the vast interlocking plant system transferred the principle of innovation to the process of mass production and raised BASF's competitiveness in that sphere as well. Both decisions of 1963, the financial and strategic, were thus closely intertwined. They laid the groundwork for numerous entrepreneurial shifts in BASF's long-term policies during the 1960s and eventually modified the face of the company.

6. ONE, TWO, MANY “LUDWIGSHAFENS”: THE INTEGRATED PRODUCTION SYSTEM AND THE SITING ISSUE

The Ludwigshafen Site

Timm's new technological paradigm of corporate policy immediately posed the question of whether the integrated operational complex at the traditional site in Ludwigshafen could reasonably be perfected at all. The discussion therefore focused on “whether the Ludwigshafen works were not exceeding the optimal operational size with such major investments.”³⁸¹ In principle,

³⁷⁹ Magener, profit planning, February 4, 1963, attachment 1 to 3/63; BASF RA.

³⁸⁰ “Umsatz des Verkaufs 1967” [Sales turnover for 1967], attachment 1 to the minutes of the managing board meeting on January 8, 1968; BASF RA.

³⁸¹ Minutes of the managing board meeting of August 5, 1963; BASF RA.

the managing board was "aware that a company whose production volume is concentrated on one geographical spot is especially vulnerable in many respects (e.g., to strikes, earthquakes, and other cases of forces beyond one's control)." Such considerations had already led to deliberate caps on growth at sites elsewhere, notably ICI in England and many industrial plants in the United States. On the other hand, the very nature of Timm's plan meant that "no essential parts of the investment program now under discussion can be removed from the plant network in Ludwigshafen without serious disadvantages."

Even more pressing obstacles stemmed from the labor market, the lack of available land, and environmental protection, and impromptu solutions were vague at best. Admittedly, expanding the basic lines of production did not seem to entail an appreciable swelling of the payroll, but in all likelihood the selective integration of small plants would require additional personnel. Because the area surrounding Ludwigshafen had no reserve labor, there was no time to waste in preparing to recruit a high number of foreign workers within two or three years.

As for space, the Ludwigshafen plant in the south part of the site and the Oppau plant in the north, which used to be clearly distinguishable from each other, had long since grown together and now constituted the core of the interlocking operational system on the 2.7 square mile tract. Whatever happened, the northern boundary was not to extend beyond the motor expressway, a clear answer to the query a few weeks earlier about whether to acquire the property on the far side of the expressway, especially the parcels belonging to Frau von Opel.³⁸² In the managing board's plans for the future, that area only had room for support facilities not intended for placement on the existing site – installations such as sewage treatment plants and refineries not belonging to BASF. The Frankenthal canal, on the other hand, was not an insurmountable barrier. To some degree, neither was the Rhine River, for Friesenheim Island south of the Mannheim GmbH oil refinery had approximately 250 acres of potential industrial terrain, which BASF acquired for expansion in 1970.³⁸³ Since 1962 the refinery and the nearby oil port had been connected with BASF on the Palatinate bank of the Rhine by an inverted siphon running nearly half a mile long beneath the river. This conduit contained a cluster of eight pipes and the pipeline carrying crude oil from Lavera, near Marseilles. In 1983 a second, larger inverted siphon was put in as well. BASF had held a majority interest in the refinery itself since 1969 through Wintershall AG, which belonged to the BASF Group. After the refinery was closed in 1988, BASF still had a few production plants in the Mannheim industrial zone. They, too, were among the "certain reserve tracts" that had to be held on to in order to absorb the future expansions that

³⁸² Minutes of the managing board meeting of June 4, 1963; BASF RA.

³⁸³ Minutes of the managing board meeting of May 25, 1970; BASF RA.

were possible only at the Ludwigshafen site according to the logic underlying Timm's proposal. But in this regard also, Timm tended to see the concept of a plant network as a chance to upgrade the site rather than overburden it with unrestrained agglomeration.

In Timm's view, even the difficulty with the environment stood a better chance of being solved through the network than before. The almost total conversion from coke to oil in gas production, combined with the closure of the carbide factory, could not help but improve at least the air quality. Nonetheless, "these problems were of a very serious nature" and were put at the top of the company's policy agenda.³⁸⁴

The lack of an alternative to the Ludwigshafen site had occupied BASF's top two leaders for some time. As early as 1960, it was clear that investment would be needed to lessen the company's dependence on the oil companies by raising BASF's own production levels. If the principle of not becoming involved in the finishing process were to be upheld, BASF would at least have to be intent on "beginning its manufacturing as close to primary production as possible."³⁸⁵ This crossroads meant critical investment decisions that were headed down the path toward raw materials for synthetic fibers and toward expansion of BASF's capacity to produce ethylene, styrene, and polystyrene. Compounded by impending decisions on the company's energy supply, which likewise called for taking a stance on the subject of siting, the prospective volume of investment grew to more than DM 500 million. Against this background, Wurster and Timm pointed out that the framework of the Ludwigshafen works and the interlocking, cooperative management embracing the plants therein would make "the further expansion in store for us much cheaper than building a whole new factory site completely from scratch."³⁸⁶

Because of financial and infrastructural concerns, however, BASF's relations with the city of Ludwigshafen could not always remain free of tension, even with Valentin Bauer, a long-standing Aniline, serving on BASF's supervisory board until 1958. During his term as mayor of Ludwigshafen until 1954, Bauer had solidified the trust between the city and its premier taxpayer by cooperating closely on city planning, real estate policy, and housing. This collaboration had continued even after Bauer had left public office, as documented by big joint urban development projects that followed, such as the restoration of Hemshof and the construction of the Pfingstweide housing estate. By the early 1960s, however, the relative sway within the symbiosis between BASF and the city was shifting more and more in favor of the company. BASF did not shrink from stating its desires "in all clarity."³⁸⁷ After all, it was a main contributor to the municipal tax revenues. In the 1960s

³⁸⁴ Minutes of the managing board meeting of August 5, 1963; BASF RA.

³⁸⁵ Minutes of the managing board meeting of February 1, 1960; BASF RA. ³⁸⁶ Ibid.

³⁸⁷ Minutes of the managing board meeting of November 21, 1960; BASF RA.

approximately one-third of the city's income came from business taxes, with BASF accounting for half of that sum.

The conflict between the factory and the city emanated primarily from the chaotic road conditions on BASF's perimeters, where the street system could no longer handle the volume of traffic spawned by the long boom in the economy. With the home-bound workforce being stranded for hours in the worsening traffic jams, BASF's managing board and works council together energetically lobbied the city administration to give priority to relocating the train station and normalizing traffic rather than rebuilding a theater.³⁸⁸ The company soon also felt absolutely overwhelmed by business taxes and property taxes. The tax burden had more than quadrupled from 1953 to 1963, prompting BASF to push for a considerable reduction in the rate of assessment from 260 percent.³⁸⁹ Because the prospects for such a change seemed negligible, the company submitted "a list of urgent wishes" to the city administration in order to negotiate compensation.

Faced with recession and mounting debt, the city ignored the list and in 1966 announced that the rate of assessment for business taxes would go from 260 to 300 percent; and for property tax, from 250 to 290 percent. This decision would have led to DM 8 million in extra taxes for BASF in 1967, a result the company considered "untenable." It filed an objection but was caught in a dilemma. Without higher tax, its highest priorities for future municipal investments could no longer be financed, for the city had nearly exhausted its borrowing capacity.³⁹⁰ When the city carried out the crucial road projects from the North Bridge to Highway 523, which bordered the factory boundaries on the west and south, the municipal debt soared. Desired projects such as the Pfingstweide housing estate and the still uncompleted new train station were left shaky.

The regional government was willing to jump in with funds in response to BASF's call for help, but partisan wrangling over the matter proved rather counterproductive. Attentive to local politics in Ludwigshafen as a state-level politician, Helmut Kohl set other priorities than BASF for the "grand coalition" he was striving to form in the city council. Educational institutions came first, transport second. The plans for enhancing the attractiveness of education for BASF included the disincorporation of the vocational school's chemistry department, in which BASF's 1,126 chemistry apprentices made up 90 percent of the students, its relocation in the immediate vicinity of the company, and the establishment of a college of technology.³⁹¹ Of course,

³⁸⁸ Ibid. ³⁸⁹ Minutes of the managing board meeting of September 16, 1963; BASF RA.

³⁹⁰ Heintzeler, "Etwaige Steuererhöhungen der Stadt Ludwigshafen," January 5, 1967; BASF RA, minutes of the managing board.

³⁹¹ Ludwigshafen vocational school, attachment 11 to 1/67; minutes of the managing board meeting of May 16, 1968; BASF RA. The plans that encountered reservations in D 100 also included the proposal "to build a national soccer league association in Ludwigshafen," *ibid.*

BASF had other wishes, the foremost of which was that there be no tax increase.³⁹² After mediation by the chamber of commerce and industry, the city administration at last declared itself prepared to forego a hike in the assessment rate in exchange for a donation of DM 3 million from the major plants sited in Ludwigshafen if business tax revenues did not reach a specified level.³⁹³ But the more BASF focused on making Ludwigshafen the economic backbone of its business and the headquarters of its worldwide activities, the less credible was the threat of transferring capacity to other locations in order to avoid adverse conditions in the company's hometown.

Looking for the Second “Ludwigshafen”

The strategic decisions in 1963 strengthened Ludwigshafen as the site of BASF's integrated operational complex. The topic of siting had a much wider meaning, however. After the managing board had moved to enlarge BASF, the search began for a second great chemical site for the company – a hunt made all the more feverish by the early failure of the plan to expand CWH into the second significant location. Attention shifted to undeveloped places beyond the West German frontier, particularly since the positive development of the common market within the European Economic Community (EEC) made it seem wise to improve BASF's position on the important French and Dutch markets for fertilizers. Fully seven years after the signing of the Treaty of Rome, initial inquiries revealed that it was still very hard in France for a foreign enterprise “to acquire suitable commercial property without a French partner.”³⁹⁴ By contrast, the Dutch authorities were keenly interested in attracting foreign companies. In Rotterdam Europoort (the region between Rotterdam and the North Sea) there was an available plot of nearly 2 square miles that Timm thought could be considered “either for a Nitrophoska plant with Shell or a ‘second Ludwigshafen.’”³⁹⁵ Dutch law, however, ruled out acquisition of the land, and the long-term lease that was offered was not acceptable for a second Ludwigshafen, although its duration was extended from 66 to 275 years during the negotiations. An available plot in Wilhelmshaven was rejected because it neighbored on the German naval port. In Hamburg, the Senate's pollution control standards for air and water were too stringent.

The search for a site for the “North Sea Port” project finally did come to a close. A polder of about 1.7 square miles on the northern end of Antwerp's new harbor basin was nearly ideal as the location for a mass-production

³⁹² Heintzeler, possible tax increases by the city of Ludwigshafen, January 5, 1967; BASF RA.

³⁹³ *Geschichte der Rechtsabteilung der BASF. Von der Gründung bis 1967*, Part XIV (1967); BASF UA, B 101.

³⁹⁴ Minutes of the managing board meeting of March 2, 1964; BASF RA.

³⁹⁵ Minutes of the managing board meeting of April 13, 1964; BASF RA.

plant. All that was missing was a dual-tax treaty with Belgium, absence of which prevented repatriation of the profits to Ludwigshafen. In Magener's opinion, though, the possibility of transferring profits should be left open so that Antwerp could "contribute to BASF's dividend if necessary."³⁹⁶ As long as profits made at the Belgium site were reinvested there, it was interesting for tax reasons as well, especially since Belgium had the lowest tax on earnings within the EEC and because a dual-tax treaty was likely sooner or later. Moreover, Magener succeeded in bringing the purchase price down from 50 to 45 Belgian francs per square meter and in negotiating a payment deadline of up to five years. By August 1964 nothing more stood in the way of an option on the contract, although still outstanding permits and other legal obstacles delayed closure of the deal until December 1965.³⁹⁷

The Belgians had already begun raising the ground level of the area and were preparing the necessary infrastructure. On December 10, 1964, BASF founded BASF Antwerpen N.V. as a 100 percent subsidiary of BASF and legal owner of the Antwerp plant. It had 500 million Belgian francs in capital. Although the legal entity of the Antwerp works was a company operating under Belgian law, a long-standing decision by the managing board in Ludwigshafen stipulated that the business policy of the works in both Ludwigshafen and Antwerp be "controlled in future by the corporate management in Ludwigshafen."³⁹⁸ Basant, as BASF Antwerp soon came to be known publicly (much to the annoyance of the Ludwigshafen managing board) legally had to be an independent company because it was located outside Germany. But lacking key features of an independent company, such as its own sales department and research staff, its organizational structure was more like that of a plant 370 miles downstream from Ludwigshafen. Anything not absolutely necessary for production was purely incidental at Basant.³⁹⁹ Partly because of this attitude, the jurisdictions and responsibilities soon came to be perceived as "pretty diffuse" in the Belgian subsidiary. Ludwigshafen division directors were empowered to issue directives to the corresponding departments in Basant, and they intervened directly in the production processes in Antwerp without coordinating their activities there. The blurred lines of authority made it simply impossible to tell who in Antwerp or Ludwigshafen bore responsibility for the many technical hitches that arose in the new company. Basant therefore topped the list of grievances to be resolved through corporate reorganization.

³⁹⁶ Minutes of the managing board meeting of September 7, 1964; BASF RA.

³⁹⁷ Minutes of the managing board meetings of August 3, 1964, and December 6, 1965; BASF RA.

³⁹⁸ Minutes of the managing board meeting of October 19, 1964; BASF RA.

³⁹⁹ Note about a discussion on BASF Antwerp on August 5, 1968, attachment 7 to 29/68; BASF RA.

The production program, too, was decided early on. The first stage of development focused on two commodities whose further growth in Ludwigshafen would have utterly exceeded Ludwigshafen capacities: (a) Nitrophoska, a homogeneous mix of nitrogen, phosphate, and potash (kali in German) for which BASF had held the patent since 1926, and (b) the nylon-6 precursor, caprolactam. Production of Nitrophoska had nearly doubled since 1958 and was still not enough “to exploit all the business possibilities that arose.”⁴⁰⁰ Although capacity within Timm’s interlocking operational system was repeatedly optimized and various snags were untangled, BASF could not manage to eliminate a peculiarity of the Odda process it used in Ludwigshafen: about 700,000 tons of compound fertilizer (1963) unavoidably produced approximately 325,000 tons of calcium ammonium nitrate. Lack of demand severely restricted the marketing of this product, but the new site enabled BASF to kill two birds with one stone. It was possible there to augment capacity through a process that avoided this undesired by-product. The rock phosphate digestion process, which was used exclusively in Antwerp, met this need but yielded vast quantities of the by-product gypsum, which could not have been stored or disposed of in Ludwigshafen. Above all, the planned total capacity of 1.5 million tons would have “led in Ludwigshafen to an all but unmanageable [degree of] concentration.” The loading situation during the fertilizer season was already “catastrophic,” and the additional nitric acid capacity would only have exacerbated the problem with the ambient air quality. Lastly, the preference for having Basant manufacture Nitrophoska also had logistical reasons. Although much of the raw materials (rock phosphate and sulfur) came from abroad, a considerable volume of the final products were exported, so long hauls on the Rhine River to and from Ludwigshafen seemed unproductive and expensive. Every ton of fertilizer inflated costs by DM 20. To supply the 300,000 tons of nitrogen needed by the Antwerp plant each year, BASF and Verenigde Kunstmestfabrieken Mekog-Albatros N.V. in Rotterdam-Pernis together created Ammoniak Unie N.V., with BASF putting up half its capital of 16 million Dutch florins.

The second main product whose capacity urgently needed expansion was caprolactam, the raw material for fiber. Its sales had nearly quadrupled to 51,400 tons since 1958. Although prices had plummeted during the same period, production costs had declined as well, so a gross operating profit of DM 1.50 per kilogram had still been possible in 1964. This result corresponded to 120 percent of the production costs, making caprolactam one of BASF’s bread-and-butter products and indisputably one of the pillars of the company’s earnings. Development of a second location for caprolactam was

⁴⁰⁰ Ibid.

also deemed a sound idea for reasons of economic security, which argued against clustering production at one site. The same thing was true for the nylon-6 primary product as for BASF's compound fertilizer. Most of the raw materials (cyclohexane and sulfur) came from abroad, and most of the final products were exported, especially the quantitatively dominant by-product, ammonium sulfate.

The production process for Nitrophoska and that for caprolactam had interlinkages that could serve as the heart of a new integrated system. The obvious move was to build manufacturing facilities for the two commodities on a common coastal site. In the first stage of development, a Nitrophoska and a caprolactam plant with annual production capacities of 600,000 tons and 60,000 tons, respectively, were built for DM 450 million. In the second stage, BASF invested DM 120 million to build plants for producing 30,000 tons of polyethylene and 110,000 tons of vinyl chloride each year. The latter product was to be processed chiefly in the manufacture of PVC at the Badische Phillips Petroleum N.V. (Badiphil) plant that had been set up in 1966 – on Basant's premises in Antwerp – as a joint venture with the Phillips Petroleum Company, with the operational management lying with BASF. BASF had also granted the license to use its method for producing and processing suspension and emulsion PVC. Under this arrangement the factories on the Scheldt River were destined, as Ludwigshafen had been, to develop into a broadly integrated production program.

The central office had calculated a payout of 18.5 percent for the amount invested during the first stage. That is, the plant was expected to amortize itself within five and a half years.⁴⁰¹ Although the operation of the fertilizer plants began on schedule in April 1967, as did the production of plastics one year later, they were far from reaching normal capacity and nowhere near running without malfunctions. The turnkey nitric acid factory delivered by the industrial plant builder Chemico proved to have "grave weaknesses." The same was true of the chlorine factory in the plastics area, where the start-up phase was complicated even more when Petrochim, a subsidiary of the Petrofina Group, was unable to deliver more than two-thirds of the formally guaranteed amount of ethylene. Dow Chemical ultimately supplied the rest by pipeline from the neighboring port city of Terneuzen, receiving in return ethylene glycol for its synthetic fiber production.

In the end, the responsibility for "a few serious technical difficulties" with Basant's start-up was attributed to the "unforeseeable failure of a renowned contracting firm," but Timm was left asking himself "how such mishaps could happen to BASF with all its many years of technical experience." The new chairman of the managing board paired the answer with clear criticism of the cost-consciousness with which Magener was rooting out the

⁴⁰¹ Ibid.

technicians' way of thinking, which was oriented solely to the physical and technical world of chemistry. Timm was firmly convinced "that the limits of 'austerity thinking' had been overstepped in some cases in Antwerp, that achievable cost savings were evidently out of all reasonable proportion with increased risk." A sharp decline in prices for the organic products manufactured in plants operating below capacity in the 1960s (from 20 percent for polyethylene to 60 percent for caprolactam) made it impossible to cover all costs and contributed to the inability to reap the returns calculated by the central office. With fertilizer the gross operating results were still DM 0.29 for 100 kilograms of nitrogen – or 25 percent of Ludwigshafen's production costs – but in Ludwigshafen the same price represented 120 percent of the production costs. Except for potash and rock phosphate, all raw materials were much more expensive in Antwerp. Capital and manufacturing costs also compared unfavorably to those in Ludwigshafen. Clearly, even after the new site had overcome its admittedly hard start, it would not get the better of Ludwigshafen anytime soon. This realization impressively confirmed Timm's strategy of building a configuration of interlocking production operations. Even a new, ultramodern plant with almost ideal conditions in every other way was unable to win on costs against the chemical production "switch-yard" as designed and developed over time in Ludwigshafen and as perfected there on the groundwork of systematic criteria after 1963. In the medium term, however, Basant had the best chances to become a truly "second" Ludwigshafen.

New production lines started up in the troubled economic times of the early 1970s. The long-planned polystyrene plant, construction of which had been suspended in 1970 because of surplus capacity on the markets for plastics, was completed in the fall of 1972 and scheduled to manufacture 165,000 tons a year. A year later a significant new shoot sprouted on the "plastics tree." BASF, having begun manufacture of flexible foams with its U.S. subsidiary Wyandotte in 1969, teamed up with the French company Pechiney Ugine Kuhlmann to start manufacturing primary products for polyurethane chemistry for the first time in Europe. Antwerp was now expanded into the manufacturing center for polyurethane primary products for the European market, a role expressed in the name given to the new joint venture: Eurane. Caprolactam capacity continued growing as well. At the December 1974 celebrations of Basant's anniversary, Matthias Seefelder, who succeeded Timm as chairman of the Antwerp subsidiary's administrative council, announced BASF's plan to double the production capacity of the site on the Scheldt estuary in the medium term.⁴⁰² Simultaneously, however, the production of chlorine, vinyl chloride, PVC, ethyl benzene, and polystyrene had to be temporarily shut down for cyclical reasons. Sales declined by 11 percent to

⁴⁰² BASF Antwerp, *Chemie*, p. 53.

17 billion Belgian francs in 1975; profit, by 66 percent to 384 million Belgian francs. The installations were operated at a capacity ranging between 50 and 70 percent. The 1979 crisis in oil prices further intensified pressure on the site. Only since the beginning of the world economy's recovery in 1982 has it been possible to execute all the planned expansions, which encompassed a new plant for Styrodur® (an extruded, rigid, polystyrene foam) and the doubling of the production of polyurethane inputs, which meant constructing four new plants. In 1989, it was decided to build an ammonia plant with a production capacity of 600,000 tons a year, one of the biggest in the world. When it became known at the same time that Antwerp was to be the location of a steam cracker, too, it was clear that the site's development into an integrated production center was finally irreversible. The fact that Antwerp operated on petrochemistry dictated the course along which the interlocking system of plants went on developing. The trend in the new corporate strategy of the BASF Group was toward backward integration, which had proved to be BASF's comparative edge in international competition. The dimensions of the cracker, which was built by Linde AG at a cost of 27 billion Belgian francs, underlined another trend that prevailed in the 1990s. As a world-scale cracker, it demonstrated BASF's intention to be one of the world's leading producers in the core business of basic chemistry.

Ludwigshafen Is Everywhere: Exporting a Model

Despite the impressive potential for efficiency that the fully integrated production complex offered as Timm's model for the organization of industrial operations, the Ludwigshafen site kept hitting its limits, whether those imposed by the labor market or by the exigencies of environmental protection. The five-year planning that BASF AG introduced in the early 1970s therefore had to include constant, ritualistic examination of pending investment projects to determine "from many different angles the extent to which they can still be tackled by the Ludwigshafen site."⁴⁰³ There were also "psychological disadvantages" stemming from the absence of the social amenities – urbanity, a cultural milieu, a high quality of life, and so forth – that often tip the balance in attracting highly qualified managers and their families. The decision about where to site a joint venture with Degussa in the promising field of construction materials was a specific example of how this category of shortcomings worked against the selection of Ludwigshafen as a place for joint investment in a new plant.⁴⁰⁴ For these "psychological" reasons, Degussa was even willing to subsidize its own location in Mainz- Mombach (which would have been at least as bleak as Ludwigshafen), but the gesture

⁴⁰³ Minutes of the managing board meeting of August 1, 1972; BASF RA.

⁴⁰⁴ Minutes of the managing board meeting of September 9, 1968; BASF RA.

was all in vain. Any other location, even Degussa's in Antwerp, was bound to be DM 1.3 million more expensive than the Ludwigshafen site each year because of the higher costs of energy and raw materials. Clearly, "the considerable earnings advantages preclude sites other than Ludwigshafen." In the end, the plant for Ultraform GmbH was "built within the Ludwigshafen premises on about 100 hectares [approximately 250 acres] of open land on lease" from BASF.⁴⁰⁵

The more the Ludwigshafen model for a plant network proved itself competitive, the more BASF used it as the pattern for the multiplying number of its sites in the world. It did not apply to all existing ones, however. For instance, the Guaratinguetá works of BASF Brasileira S.A., Indústrias Químicas, São Paulo, had focused on the manufacture of dyeing aids, hydrosulfide, Styropor, and polymer dispersions. The plant premises on the bank of the Paraíba do Sul, almost exactly midway between São Paulo and Rio de Janeiro, developed into a more diversified site with the entire Latin American region in mind as a sales area. Beginning in 1968, the expansion of the BASF Española production site in Tarragona, on the coast some 56 miles south of Barcelona, took aim at the Mediterranean market. With the choice of this spot, which had been arduous, the parent company always kept open "the possibility of later going beyond Styropor and perhaps dispersions and of advancing into larger syntheses."⁴⁰⁶

Similar considerations relating to the domestic U.S. market guided BASF in the search for a site on which to gather and integrate the numerous small production units of the BASF Corporation. In 1969 a location in Port Victoria, South Carolina, won out against one in Puerto Rico. The very size of the mainland site impressed Willi Danz, the managing board member in charge of production. He reported that it was about as spacious as the Ludwigshafen grounds and that a plant on the scale of Basant would likely arise there over the years.⁴⁰⁷ Acquisition of the land was thwarted, however, by a broad coalition of wealthy retirees who would not tolerate a chemical works on their doorsteps, fishermen who feared for their catches, and environmental protectionists who had powerful connections in Washington.

BASF finally found an adequate location in Geismar, Louisiana, one of the sites of the Wyandotte Chemicals Corporation, which BASF had just acquired. The area was a former cotton plantation of about four square miles directly on the Mississippi River. The installations are designed for a

⁴⁰⁵ Rechtsabteilung, "Grundzüge einer Zusammenarbeit zwischen BASF und Degussa auf dem Gebiet der Herstellung von Trioxan-Copolymerisaten" [Principles of Cooperation between BASF and Degussa in the Area of Manufacturing Trioxan Copolymers], November 29, 1958, attachment 7 to 39/68, minutes of the managing board; BASF RA.

⁴⁰⁶ Kordinat [Coordination Department], BASF Española: Final approval for land acquisition in Tarragona, January 27, 1967, attachment 2 to 6/67, minutes of the managing board; BASF RA.

⁴⁰⁷ Minutes of the managing board meeting of August 25, 1969; BASF RA.

production program of a breadth similar to that of the Ludwigshafen works. The cardinal primary products for BASF's range of polyurethane plastics are made in Geismar. There is also a production line for the basic chemical acetylene and its subsequent chemical uses. Among the many other production sites operated by BASF in the United States – in the early 1990s there were more than 70, employing a total of 21,000 people – only the works in Freeport, Texas, can be regarded as an integrated plant complex. The emphasis there is on the manufacturing of acrylic acid, its secondary products, and primary products of fibers. With the construction of the world's largest naphtha steam cracker in Port Arthur, Texas, and an investment of \$1 billion – Ludwigshafen's biggest outside Europe thus far – BASF and TotalFinaElf in the Gulf of Mexico are jointly creating the conditions for expanding yet another integrated petrochemical plant system.⁴⁰⁸ Within five or six years, BASF's share (860,000 tons) of all propylene production and of the approximately equal amount of ethylene production is expected to be consumed completely at the U.S. sites of fully integrated plant complexes. BASF's share of the propylene from the cracker is transported by pipeline to Freeport via Mont Belvieu, Texas; the ethylene, by pipeline to Geismar. The steam cracker has been a BASF trademark ever since this technology developed from the company's own tradition of high-pressure technology in Wesseling and became the technological focus of ROW. BASF did not build its own first naphtha steam cracker (primarily for obtaining ethylene and propylene) until 1980 in Ludwigshafen. It committed DM 400 million to the project, more than any other BASF investment up to that time. This technology has since crowned new sites of integrated plant complexes, complementing the two steam crackers in Ludwigshafen and the one in Antwerp. The newest integrated plant system, which is under construction in Nanjing, China, will also be grouped around a major installation of this type.

The fully integrated plant complex as a technological principle is as old as BASF itself. The idea of combining the research and production of textile dyestuffs in one enterprise was one of the ideas on which Friedrich Engelhorn established BASF. From that time on, the individual production lines have been synchronized with each other in a way that enables products and residual materials of one factory to serve as raw materials for the next one. Since 1963, BASF has systematically expanded and perfected this system of interlocking operations. Today, all 350 plants of what is the most immense chemistry complex in the world are connected with other plants through at least one product or process stage. In terms of energy, infrastructure, and logistics this system's cost advantage over a conceivable decentralized

⁴⁰⁸ "Die BASF investiert groß in Übersee," *Frankfurter Allgemeine Zeitung*, January 24, 1997; "BASF FINA Petrochemicals Celebrates Construction Start of World's Largest Steam Cracker," press release of BASF FINA Petrochemicals Limited Partnership, November 12, 1998, BASF UA, C 8211.

alternative came to €500,000 in 1995. Process research alone accounts for 28 percent of total outlays of research and development.

Producing within the interlocking operational complex means taking only a few raw materials and manufacturing a few dozen primary materials. They are then used to make several hundred intermediate products, from which, in turn, around 8,000 different articles such as plastics, antifreeze, and vitamins originate in ramified process and value-adding chains. The superiority of this system preserves BASF's status as the producer with the lowest costs for many intermediates. It thereby ensures the company's cost leadership in these areas. This edge is also honed by the ability of the compound system to economize on energy, a contribution that has cut BASF's consumption of fossil fuels since the 1970s. One plant's waste heat becomes another plant's source of energy. Basant has brought this method to the point that the production process generated enough steam from April through November to cover the plant's own needs. The steam power plant at the Antwerp site became obsolete in the mid-1980s. It was shut down, and the principle of integrated heating was introduced at all such plant complexes of BASF. The idea of taking this principle and its synergies as an essential element of the corporate philosophy and transferring them to other contexts outside the realm of technology is obvious because it has shaped the thinking and behavior of the Anilines from the outset. The principle represents nothing more and nothing less than the intangible foundations of production as opposed to the unmistakable physical form that the integrated production system has taken on.

The underlying philosophy of the interlocking operational system has not altered to this day and will remain crucial to both the success of the enterprise in general and its siting policy in particular in the foreseeable future. The cornerstone consists of secure access to the raw materials and basic chemicals at the center of each production process. To that end, individual production processes are made to intersect in chains and networks wherever suitable. All highly finished products grow out of just a few basic chemicals, mainly sulfuric acid, ethylene, and ammonia. They are among the approximately 300 timeless industrial chemicals called the “immortals.” BASF produces about two-thirds of these “classical” chemicals, giving it the widest range of all chemical companies in this area. The system of fully integrated production structures relies heavily not only on basic chemicals but on intermediates, too – the building blocks for many of the different syntheses with which BASF advanced beyond dyestuffs and into the areas of plastics, agrochemicals, pharmaceuticals, and fine chemicals. The fact that nearly 70 percent of all intermediates in the BASF Group still came from Ludwigshafen in the 1990s underscores the central place of BASF AG in this area and emphasizes the stable, finely calibrated, and mature aspects of this technology. Not until just recently have there been indications that newer integrated production sites are gaining the upper hand on Ludwigshafen in cost comparison.

Challenge I: Nuclear Power Plant

In the late 1960s BASF judged that the world had only two chemical production sites with advantages similar to those enjoyed in Ludwigshafen.⁴⁰⁹ Both locations lay in the United States and, like the chemical agglomeration on the Gulf of Mexico, boasted ready access to both raw materials and energy sources. Sitting upon neither, Ludwigshafen was a peculiarity within this trio. The BASF managing board was thus exceptionally receptive to ideas on using technological advances to compensate for the site's natural drawbacks, at least in the energy sector. True, the company was connected to the Southern European and transalpine pipeline system via Marseilles and Trieste, but political events in the Near East and Western Africa demonstrated how insecure this energy supply line could be. In June 1967 the third Arab-Israeli armed conflict, the Six-Day War, led to the first collective attempt by the oil-producing countries to use oil as a political weapon. Although their action caused no immediate and abiding disruption of the markets, the formation of the Organization of Petroleum Exporting Countries (later better known as OPEC) did shift control over crude oil, a change that made the embargo into a dress rehearsal for greater power struggles.⁴¹⁰ The Six-Day War and the civil war that broke out in Nigeria over the issue of Biafran secession accelerated the managing board's thinking about building BASF's own nuclear power plant, especially since the city of Mannheim had shown interest in "perhaps constructing such a power plant with BASF on Friesenheim Island."⁴¹¹ Atomic power was not the only possible alternative. Other ones under consideration were a search for new sites for petrochemical production "in the geographic vicinity of crude oil deposits and natural gas fields" and the idea of having the pipelines for Dutch natural gas rerouted to Ludwigshafen. Calling attention to the disputes over the relationship between BASF's Auguste Victoria mine and Ruhrkohle AG, Willi Danz had already reminded his colleagues on the managing board not to forget the "necessity" of "bringing atomic energy to BASF in good time."⁴¹²

Wurster and Timm had never lost sight of the "development of the peaceful use of atomic energy." In 1954 – even before "atoms for peace" was enveloped by the euphoria kindled by Dwight D. Eisenhower, which climaxed in 1955 at the first Geneva conference on atomic power – Timm had sought out the Max Planck Society and Werner Heisenberg for "certain preliminary

⁴⁰⁹ Willi Danz, managing board member in charge of production. Rechtsabteilung, "Notiz, betr. Kernkraftwerksprojekt: Besuch im Ministerium für Wirtschaft und Verkehr, Mainz, am 8.1.1969," January 1, 1969; BASF UA, Ordner Kernkraftwerk, Behörden, Genehmigungsverfahren.

⁴¹⁰ Hohensee, *Ölpreisschock*, p. 27.

⁴¹¹ Minutes of the managing board meeting of July 17, 1967; BASF RA.

⁴¹² Minutes of the managing board meeting of November 21, 1966; BASF RA.

clarifications” about using the new technology.⁴¹³ Looking for a new technological vision that could give BASF’s strong technology a worthwhile goal, Ernst Bartholomé, a BASF expert on process engineering, attended the Geneva conference on atomic power as the company’s official observer. But whereas Hoechst’s ambitions in the nuclear field soon grew, Ludwigshafen’s response ranged from open to skeptical, although the board was prepared in 1956 to take over a stake of DM 500,000 in Kernreaktorfinanzierungs-GmbH as a “lost contribution” to the construction of the Karlsruhe nuclear research reactor.⁴¹⁴ Thanks to this involvement, Timm finally realized that the “first fit of enthusiasm” in the business with atomic reactors had passed. Unlike the military use of nuclear energy, civilian use of the new technology was still a vision for the future. Indeed, it was doubtful that nuclear energy in the civilian sector would ever offer chemistry a potential field of work. Fully 30 percent of all investment in reactors went for measuring instruments and control technology; 40 to 50 percent, for buildings and simple equipment. Not all that much was left for the actual reactor – and that, too, had “nothing to do with chemistry, of course.”⁴¹⁵ Outside the reactor, the thrust in that area of expertise was “hot chemistry,” but the “serious men” present at the information forums of the Karlsruhe planning company “wanted mostly to keep their distance.” After the peaceful use of atomic energy had been classified as inauspicious for BASF’s core business in chemicals, it is not surprising that BASF was unwilling in 1959 to help build a nuclear power plant that the utility company Energie-Versorgung Schwaben AG wanted in Northern Baden.⁴¹⁶ Instead, a 25-year supply contract linking BASF, the Auguste Victoria mine, and RWE, including the output of BASF’s power plant in Marl, was signed with RWE in 1961.

Even as the electricity contract was being signed with RWE, fears were voiced that atomic energy could drastically reduce the cost of electricity and thereby leave BASF stranded at a higher price level.⁴¹⁷ The experts in Ludwigshafen, however, considered that eventuality to be unlikely for the next 15 to 20 years. After the summer storm on the crude oil markets in 1967, which was justifiably understood as an omen of more crises to come, this judgment changed fundamentally. Until then, preparatory measures of BASF’s technology and engineering department had only been like planning games. The construction of nuclear power plants had seemed economically

⁴¹³ Minutes of the managing board meeting of October 9, 1954; BASF RA. Professor Werner Heisenberg was considered the leading mind in German nuclear research in World War II. In the 1950s this theoretician was the figurehead in the field in Germany and was Konrad Adenauer’s top authority on matters relating to atomic energy.

⁴¹⁴ Minutes of the managing board meeting of June 29, 1956; BASF RA.

⁴¹⁵ Timm to Wurster, January 25, 1957, BASF RA, minutes of the managing board.

⁴¹⁶ Minutes of the managing board meeting of July 13, 1959; BASF RA.

⁴¹⁷ Minutes of the managing board meeting of September 11, 1961; BASF RA.

unprofitable until 1965. Even the 237-megawatt demonstration power plant jointly built by RWE and Bayernwerk from 1962 to 1966 made no breakthrough. Construction delays occurred, and the completed plant could not compete with the profitability of the lignite-fired power plants that RWE continued to prefer.⁴¹⁸

Nevertheless, it was foreseeable after 1965 that the development of reactor technology would make it possible to build economical nuclear power plants very soon.⁴¹⁹ The first commercial U.S. nuclear power plant, a 640-megawatt facility in Oyster Creek, New Jersey, was about to go on-line. Dow Chemical, a major chemical company comparable to BASF in many respects, was planning the first "company-owned" nuclear power plant, which was to be built in Midland, Michigan. Bayer and Hoechst, too, began thinking about building their own nuclear power plants. In 1966 BASF had AEG Telefunken, Brown Boveri & Cie. (BBC), and Siemens draw up proposals for the construction of a twin reactor block for generating process steam (2,000 tons per hour and electrical energy (2 x 600 megawatts). RWE was simultaneously approached to see whether it would be willing to tackle such a project along with BASF. After studies were submitted, the preinvestment analysis showed that the costs of electricity and steam calculated according to the same assumptions could be lowered by approximately DM 100 million a year compared to conventional oil-fired backpressure power plants. Such was the state of things in early July 1967, shortly after the Six-Day War, which changed the power relations on the world's crude-oil markets for a long time.

The planning games of the engineers now became a priority of BASF's corporate policy.⁴²⁰ At first, an attempt was made with RWE and the Grosskraftwerk (superpower plant) in Mannheim (GKM) to build a joint facility in order to use the economies of scale afforded by large power plants. RWE seemed to agree in principle at first, but eventually insisted on keeping its monopoly on electricity production and made the joint venture contingent on recognition of the existing contract calling for the delivery of electricity only.⁴²¹ Negotiations therefore soon faltered. Consortium agreement on forming the Nuclear Power Plant BASF-Mannheim AG remained stuck in the planning stage as well because the joint project with GKM was unlikely to result in cost advantages over BASF's own process.⁴²²

⁴¹⁸ Radkau, *RWE*, pp. 188–93.

⁴¹⁹ TLK, BASF nuclear power project, Final report on planning work and approval processes from 1965 to 1977; BASF UA, Kernkraftwerk.

⁴²⁰ Minutes of the managing board meeting of September 16, 1968; BASF RA.

⁴²¹ Rechtsabteilung, "Notiz, betr. Kernkraftwerksprojekt: Besuch im Ministerium für Wirtschaft und Verkehr, Mainz, am 8.1.1969," January 14, 1969; BASF UA, Ordner Kernkraftwerk, Behörden, Genehmigungsverfahren.

⁴²² TLK, BASF nuclear power project, Final report on planning work and approval procedures from 1965 to 1977; BASF UA, Kernkraftwerk.

Toward the end of 1968 BASF prepared to build the nuclear power plant on its own. Its siting – obviously a key facet of the licensing procedure – was decided first. All three proposed locations – the old carbide factory in the center of the Ludwigshafen works, Friesenheim Island to the east, and the Frankenthal canal to the north – were classified in the same safety category by the Institute for Reactor Safety. It was thus expediency that led BASF to choose the grounds of the closed carbide factory in block A 800. Connecting the new plant to the existing steam and electricity grids would be simplest there. In early January 1969, Danz, BASF’s responsible managing board member, set out to inform the Minister of Economics of the State of Rhineland-Palatinate, who was in charge of building permits, about the forthcoming submission of an application. He learned, however, that RWE had long since formally filed for permission to build a nuclear power plant in Biblis, Hesse. This discovery put the BASF project on the defensive even before it officially started.

On May 7, 1969, BASF applied for an initial building permit anyway in accordance with Section 3 (siting approval) of Germany’s Atomic Energy Act of 1960 (Law on the Peaceful Use of Nuclear Energy and Protection from Its Hazards). It had already been decided to construct a Siemens pressurized water reactor, a choice later confirmed in a report by Bechtel Corp., the American plant builder. In November, BASF sent Kraftwerk Union, a subsidiary of AEG-Telefunken and Siemens, a corresponding purchase decision with an attached planning order for DM 1.5 million. BASF had already ordered a 400-ton-per-hour steam boiler in order to shorten waiting times. Permits were expected to take a year, and the company wanted to begin operating the nuclear power plant by 1975 at the latest. The Rhineland-Palatinate state government endorsed the application “without reserve” and tried everything in its power to block the construction project in Biblis. BASF could not help but find it important to “prevent excessive pollution of the Rhine with wastewater from two nuclear power plants close to each other.”⁴²³ Support also came from the Ludwigshafen city council, which voted in favor of the project in early 1970, with only one abstention.

The city of Mannheim, however, which in 1968 would have gladly joined in, saw itself forced to object to the BASF application in order to protect its own interests.⁴²⁴ Picking up on ideas voiced within the Reactor Safety Commission – chaired by Josef Wengler, a former member of Hoechst’s managing board – Mannheim pressed to have the nuclear power plant built underground. Meeting this demand would have hiked costs by DM 50 million. To

⁴²³ Minutes of the managing board meeting of November 19, 1968; BASF RA.

⁴²⁴ Chief Mayor of Mannheim to the Ministry of Economics and Transport of the *Land* of Rhineland-Palatinate, “betr. Errichtung eines Kernkraftwerks der BASF in Ludwigshafen” [re: construction of a BASF nuclear power plant in Ludwigshafen], February 24, 1970; BASF UA, Kernkraftwerk.

permit “a former member of a rival company’s board to chair a public commission deliberating a BASF matter” was “an unconscionable situation” for Ludwigshafen, which lodged a protest with the atomic forum.⁴²⁵ The commission’s proposal immediately called the Rhineland-Palatinate state government into action. At a hearing held on-site in Ludwigshafen by the Reactor Safety Commission, the government made it clear that the water authorities would veto underground construction of the power plant because of possible danger to the drinking water.⁴²⁶

BASF and Siemens offered further preventive and mitigating measures, including a pledge to provide the pressure tank with an antirupture guard and to place crucial sets of equipment in bunkers. For this reason the director of BASF’s technology and engineering department, Berthold Frank, still firmly believed in March that the process would end soon. To avoid a three-year delay at Kraftwerk Union, he argued for placing “certain orders” beforehand, even if it meant risking cancellation fees of DM 5 million.⁴²⁷ Frank was mistaken. In mid-1970 Germany’s Federal Ministry for Education and Science called a two-year moratorium to think over in broad terms the safety demands of nuclear power plants located near urban centers. In a report commissioned by BASF, the Bechtel Corporation had brought up this sensitive subject, although it tried to strike a balance by stating that the project met American safety regulations:

The uncertainty in the BASF case lies in the proximity of a highly populated area. Neither the USA nor the United Kingdom have placed nuclear plants in equivalently populated areas as yet.... Although there is no precedent as yet for granting a license in such a populated site, the Bechtel evaluation shows that the BASF site meets published US-AEC criteria.⁴²⁸

Positive signals existed as well. The authorities of the European Atomic Energy Community (Euratom) in Brussels were expected to recognize the project as deserving support because it was the first nuclear power plant for process steam. This likelihood opened funding channels through the Brussels Eurobank, a turn of events that augured well for “possible financing totally outside BASF’s investment budget.”⁴²⁹ The hope that RWE could participate also continued to germinate.

Reality looked different. RWE had no intention of cooperation with BASF and instead threw itself fully into building Biblis A, the 1,200-megawatt

⁴²⁵ Minutes of the managing board meeting of January 12, 1970; BASF RA.

⁴²⁶ TLK, BASF nuclear power project, Final report on planning work and approval procedures from 1965 to 1977; BASF UA, Kernkraftwerk.

⁴²⁷ Minutes of the managing board meeting of March 2, 1970; BASF RA.

⁴²⁸ Bechtel Corporation, BASF-Technical Evaluation of Proposed Dual-Purpose Nuclear Plants (confidential), November 1969, p. 16; BASF UA, Kernkraftwerk Allgemein. US-AEC is the abbreviation for the United States Atomic Energy Commission.

⁴²⁹ Attachment 3 to 28/70 for the managing board meeting on June 15, 1970, “betr. Kernkraftwerk”; BASF RA, minutes of the managing board.

nuclear power plant. In the first months of 1970, BASF was overcome by the financial exigencies of a liquidity crisis that engulfed the nuclear power plant project, among other things.⁴³⁰ The managing board decided to carry out only the first stage of the project for the time being and notified the manufacturer, Klöckner AG, to cancel the order for the pressure tank of the second block. When the Federal Ministry for Education and Science called the moratorium, BASF also had to cancel the order for the first pressure tank, incurring costs of DM 2 million.

During the long delay that now began in the approval process, hundreds of questions about safety were answered. After the moratorium expired in August 1972, it was clear “that BASF had thoroughly met the additional safety measures required thus far and had worked out a solution to which no further objections could be raised.”⁴³¹ Nonetheless, Minister of Economics Klaus von Dohnanyi made it “unmistakably known that the decision he was going to have to make would not be his alone but rather would have to fall to a new federal government.” Von Dohnanyi had to concede that the BASF nuclear power plant “had a far higher degree of safety than all other nuclear power plants operating and approved in the world.” But that assessment did not change the fact that “the German government was loath to be the first to make such a decision.”

In mid-1973 approval once again seemed imminent after the Reactor Safety Commission had recommended that the project be continued, but the topic had long since become a political concern of the highest order. In December 1972, after the new government had been formed, central responsibility for nuclear safety technology and protection from radiation passed to the Federal Ministry of the Interior, headed by Hans-Dietrich Genscher, who recognized environmental policy as a prominent political field in which to distinguish himself. With the outbreak of the oil price crisis in November 1973, the project was overtaken by events whose negative effects it was actually intended to soften. Timm attempted to use the opportunity “to conduct PR for our planned nuclear power plant in order to create a public mood more open to approval by the federal government.”⁴³² Time was short. Because the fuel supply of the nuclear power plant had to be planned five years in advance in order to secure allocation of enriched fissionable uranium 235, BASF had to decide whether to go out on a limb again. Still determined to follow through on the project, the company concluded an enrichment contract with the United States Atomic Energy Commission in June 1974. By September 1976 it had paid three “lost” advances of \$902,000 each.⁴³³

⁴³⁰ See section 8 on this point.

⁴³¹ Minutes of the managing board meeting of August 1, 1972; BASF RA.

⁴³² Minutes of the managing board meeting of November 13, 1973; BASF RA.

⁴³³ TLK, BASF nuclear power project, Final report on planning work and approval procedures from 1965 to 1977; BASF UA, Kernkraftwerk.

The optimism was misplaced in this instance, too. The German Federal Ministry of the Interior issued a directive, "Protection of Nuclear Power Plants against Shock Waves from Chemical Reactions," which required the sites of nuclear power plants to be at least 463 yards from the Rhine in order to protect them from explosions on passing ships. This regulation was obviously aimed at BASF, for block A 800 was situated not even 55 yards from the river. The site in the middle of the BASF complex in Ludwigshafen was no longer viable after the directive went into effect in 1976. When the new Interior Minister Werner Maihofer had made it clear that only a change of site could lead to approval for the nuclear power plant, BASF responded yet again. In March the company moved it just over three miles north to the Frankenthal district.⁴³⁴ The new grounds lay north of the sewage-treatment plant, where a subterranean gas storage unit of Saar-Ferngas AG had been planned until then. The whole procedure thus seemed to restart at square one. Meanwhile, however, the nuclear power plant's projected investment costs had risen from DM 450 million (1970) for the site in the middle of the Ludwigshafen plant to DM 2.1 billion for the northern site, and the projected mean annual savings of DM 100 million (1970) had dwindled to DM 60 million (1976). Not all changes were due to the change of site. Projected costs had climbed in block A 800 also – to DM 1.25 billion – but so had the expected savings, which after the oil price crisis had grown to DM 210 million. These figures dramatically shifted the underlying calculus of the funding. The burden of approximately DM 3 billion that would have accrued by the anticipated end of construction was bound to outstrip the financial strength of the BASF Group to the disadvantage of the core business. Faced with this outcome, the managing board voted in December 1976 to give up on the project once and for all.⁴³⁵ It had entailed DM 36 million in sunk costs since 1968.⁴³⁶

This decision stymied the effort to shore up a vulnerable flank of Ludwigshafen's fully integrated production complex. With annual consumption having reached 600 megawatts by the early 1980s, every 1-pfennig more in the price of electricity meant extra costs of DM 50 million. An increase of three or four pfennigs translated into higher costs equivalent to the size of the dividend, as noted publicly in 1982 by Ronaldo Schmitz, the responsible member of the managing board.⁴³⁷ He was not talking theory. Since 1980, RWE had been demanding a revision of the 1962 electricity-supply contract

⁴³⁴ BASF to the Ministry of Economics and Transport on May 11, 1976; BASF UA, Kernkraftwerk, Allgemein.

⁴³⁵ Minutes of the managing board meeting of December 9, 1976; BASF RA.

⁴³⁶ TLK, BASF nuclear power project, Final report on planning work and approval procedures from 1965 to 1977; BASF UA, Kernkraftwerk.

⁴³⁷ "BASF: Strompreis gefährdet Arbeitsplätze" [BASF: Price of electricity jeopardizes jobs], *Rheinpfalz*, November 10, 1982.

because the production costs had soared since then. BASF was willing to adjust the prices but wanted to extend the contract until 1992, whereas RWE, clearly mentioning the possibility of new price increases, wanted to prolong it by only two years, until 1988.⁴³⁸ To avoid becoming entirely dependent on RWE, BASF began planning a new coal-fired power plant in 1980, envisioning it for the site that would have been occupied by block A 800. The company also tried to establish supply relations with Electricité de France (EDF), a public enterprise able to underbid RWE’s prices by two pfennigs per kilowatt hour – not least because of the headlong development of nuclear energy in France.⁴³⁹ Schmitz publicly denounced “RWE’s barbaric brutality” and demanded the nationalization of the area monopoly,⁴⁴⁰ but he was thwarted by the constraints of Germany’s strictly regulated electricity market. EDF was not permitted to supply electricity to BASF, and RWE was not willing to treat BASF as a small electrical utility entitled to special conditions.⁴⁴¹ Because no agreement was reached, RWE terminated the contract on schedule in 1983, so no contract existed between RWE and BASF from 1986 to 1988. Relations between the two companies intensified under the new, comprehensive contract, which had BASF’s power plant in Marl sell what it produced to RWE. In 1997, construction of a gas-fired RWE power plant was completed in the southern part of BASF’s complex (C 211). It is able to provide half the electricity and one-sixth of the steam needed by Ludwigshafen’s plant network.⁴⁴²

Challenge II: Environmental Protection

The environmental aspect of operating a highly compact chemical production site such as Ludwigshafen surfaced in the managing board’s discussions for the first time in the 1960s. Monitoring stations in Hesse were finding “BASF dyestuffs” in fish from the Rhine River with ever greater frequency, and in the company’s eyes the public discussion of wastewater was culminating in “outrageous reproaches against industry.” Laborious countermeasures through the media offered the only defense.⁴⁴³ The facts were difficult to refute, though. The Ludwigshafen works had hit the limits of their waste-disposal capacity. The main wastewater drains were overloaded, and all

⁴³⁸ Landhäusser [energy department employee], discussion note “betr. Neuregelung des Stromlieferungsvertrages BASF/RWE,” June 28, 1982; BASF UA, energy supply.

⁴³⁹ Moritz [energy department employee], note “betr. Stromkostenvergleich Frankreich/RWE für stromintensive Verbraucher,” June 1, 1982; BASF UA, energy supply.

⁴⁴⁰ “Stromgigant gibt dem Chemieriesen kontra,” *Mannheimer Morgen*, January 13, 1983.

⁴⁴¹ Landhäusser, “Neuregelung des Stromlieferungsvertrages BASF/RWE” – discussion on August 31, 1982, in Essen, September 21, 1982; BASF UA, energy supply.

⁴⁴² Hermann Seubert, “Geschichte der BASF-Energieabteilung, bzw. BASF-Energieversorgung 1960–1998” (typewritten manuscript), Ludwigshafen 1999; BASF UA.

⁴⁴³ Minutes of the managing board meetings of May 2, 1960, and February 6, 1961; BASF RA.

BASF could do to cope with “the unhappy situation” was rely on exceptions allowed by the Palatinate state government. Conversely, the company itself was a victim of the Rhine’s dramatically worsening water quality, for the water that BASF took from the river and heated for industrial purposes bred bacteria profusely, steadily diminishing its effectiveness as a raw material and a coolant. BASF contributed much to reinforcing this effect downstream by drawing up to four million cubic meters of water, depending on the season, or between 3 and 6 percent of the river’s total water volume, depending on the water duct. Industrial operations also raised the risk to the water supply of millions of people drinking riverbank-filtered water. The pressure caused by the problem became so severe in the 1950s that the managing board decided in 1959 to commission a study of wastewater pollution of the Rhine in the area of Mannheim-Ludwigshafen. The board duly requested Franz Pöpel, a professor of residential hydraulic engineering at the College of Technology in Stuttgart, to conduct the analysis and draft proposals for solving the trouble with water management in the Rhine-Neckar region. Above all, however, he was also asked to develop a plan for modernizing BASF’s wastewater disposal processes.

Pöpel found that the pollution load of the Rhine River in the Neckar region had risen by 67 percent.⁴⁴⁴ Half the blame lay with the 500,000 inhabitants of Mannheim, Ludwigshafen, and Frankenthal; half with industry. In other words, BASF was by no means solely responsible. The report came to an obvious conclusion for BASF. An economically reasonable treatment of BASF’s industrial wastewater was possible only if the polluted water was first separated from the uncontaminated cooling water, which made up 85 to 90 percent of all the water used by BASF for industrial purposes. Therefore, the combined sewer system that had been in operation for 95 years had to be replaced by two separate drainage systems. The first, with 13 efflux channels, was for carrying the cooling water and other harmless wastewater directly back into the main outfall. All wastewater containing biodegradable substances was to be collected in the second system and then pumped into a water-treatment plant yet to be built. The cities of Ludwigshafen and Frankenthal were also to purify their sewage in this plant.

When the report was submitted in 1960, the German federal government had just passed the Federal Waterways Pollution Prevention Act, which considerably lowered the permissible levels of water pollution. Although the act was repealed two years later by the Federal Constitutional Court on the grounds that the legislation violated states’ rights, a growing need for action was clear. Before the construction of the separate sewage systems

⁴⁴⁴ On this issue and the following treatment, see Hans Joachim Frost, “Vom ‘Pöpel-Gutachten’ zum heutigen Stand der Abwasserbehandlung bei der BASF AG – Ludwigshafen am Rhein,” in Symposium Gewässerschutz bei der BASF AG, Ludwigshafen, November 12, 1976, lectures, pp. 1–11; BASF UA, R 835, Kläranlage.

commenced, however, BASF's research department tested the wastewater for the possibility of purifying it biologically. The result was impressive. More than 90 percent of the biochemical oxygen demand of the industrial effluents studied could be removed. BASF subsequently gave the Palatinate district government the information on which the latter based its repeatedly postponed administrative decision on improvement of BASF's wastewater management. This notice of September 1964 definitively mandated the construction of a biological sewage treatment plant no later than the end of 1974, the immediate commencement of construction of an intercepting sewer, and regular progress reports on the construction. On principle, the Palatinate district government had already rejected the possibility of granting BASF title over the new sewage system to be built.⁴⁴⁵ After clarification of the technical and substantive questions involved, construction work began on a second, 20-mile sewage network for collecting and channeling the wastewater that needed treatment. In 1970 an experimental treatment plant was built, and in December 1972 ground was broken for construction of the BASF-Ludwigshafen-Frankenthal joint sewage treatment plant.

The plant started operations on schedule in December 1974 and has been expanded many times since then. The decision to invest DM 450 million in environmental protection was not altogether voluntary. BASF itself considered the sewage situation of the Rhine "ominous," and there were few ways to relieve it through ad hoc measures, which would have been expensive on top of it all.⁴⁴⁶ The water level had been declining steadily since 1971, the result being that the river's oxygen level in the Mainz area had fallen well below 2 mg/liter and "in some places to nearly zero." Despite such critical circumstances, the dimensions and sustainability of the project were unprecedented in the 1960s. Since that time, BASF has not contributed significantly to deterioration of the Rhine River's oxygen level. Ninety-five percent of the organic matter is removed from the wastewater, as is 98 percent of the nitrate, a crucial substance checked for in the treatment of drinking water.

By contrast, the treatment plant changed little in the overall amount of salt and other inorganic pollutants that BASF released into the Rhine. Even before the plant began operating, approval for expansion of two factories (for Palatin Fast dyes and for Ludoplex) had been denied to BASF because they would have increased the salt load of the river.⁴⁴⁷ Indeed, salt contamination went *up* slightly because the neutralization of the wastewater that had to be treated entailed additional amounts of salt far exceeding the amount of

⁴⁴⁵ Minutes of the managing board meeting of February 6, 1961; BASF RA.

⁴⁴⁶ F. J. Frank to Dr. Frank, director, "betr. Abwassersituation," March 6, 1972, attachment 4 to 6/72; BASF RA, minutes of the managing board.

⁴⁴⁷ BASF, TUU/W, "Salzfracht des Abwassers der BASF, Werk Ludwigshafen – Erfüllung behördlicher Auflagen," May 18, 1973, attachment 6 to 13/73; BASF RA, minutes of the managing board.

nitrate that was removed. Leeway for approval widened by about 10 percent only because a sulfuric-acid waste treatment plant came on-line at the same time, but the pressure for further improvement continued. Timm's environmental policy directive had been markedly progressive since the early 1970s, although his reasons for it were essentially tactical: "For BASF's corporate policy, it is important to induce a cooperative attitude in the authorities and keep them from imposing excessive strictures under the influence of public discussion."⁴⁴⁸

BASF's struggle with industrial wastewater did not vanish from the headlines, though. Although it had been possible by the late 1980s to halve the polluting substances emitted into the Rhine⁴⁴⁹ – and to sustain this trend – the public was alarmed again and again by breakdowns in the otherwise comprehensive system of water treatment. The catastrophic fire at Sandoz AG (Schweizerhalle near Basel), which devastated the fauna of the Rhine River, and the leak in Ludwigshafen (U 46) four weeks later spotlighted the weaknesses of large-scale chemical technology, which is always vulnerable to publicly conspicuous accidents no matter how exemplary the environmental protection is. Major outlays for emission monitoring, extensive automatic surveillance systems, the existing emission registers since 1968, and, since 1992, a new storage tank for regulating massive amounts of polluted water are intended to prevent or mitigate such incidents, or at least to warn the public in time.

The complications of maintaining clean air were no less acute than those of maintaining clean water. They could not be neutralized much longer by having the engineering department try to eliminate or make invisible nitrous vitriol exhaust and other emissions that "could be seen far and wide."⁴⁵⁰ Nor was it enough to count on technological progress alone, which almost inevitably brought about improvements with the transition from coal to petrochemistry as the primary energy source in BASF's three power plants and elsewhere. The air quality in the area of Mannheim and Ludwigshafen was also helped by the closure of the carbide factory, which belched 1,607 pounds of dust per hour into the air until 1965. On the whole, however, dust emission in the 1970s was brought under control only with heavy financial investment in filter technology. It was harder to eliminate gaseous wastes, such as nitrous gases and nitrogen oxides (which occur in the production of both energy and potassium nitrate) and hydrocarbons (which in principle are valuable sources of energy whose flaring was an outright waste of resources). The high concentration of plants that resulted from perfecting the configuration of interlocking production operations since the 1960s compounded

⁴⁴⁸ Minutes of the managing board meeting of April 11, 1972; BASF RA.

⁴⁴⁹ "Einweihung BASF-Umweltzentrale am 29.5.1989." Statements by Dr. Peter Tonne, Director of the Department of Emissions Monitoring and Ecology, BASF press information of May 29, 1989.

⁴⁵⁰ Minutes of the managing board meeting of August 5, 1963; BASF RA.

environmental burdens but simultaneously afforded the opportunity to recycle wastes by using them as raw materials in a related production line. The density of the site also promoted the efficient use of key air and water treatment installations. The central planning office, for example, decided that the second plant that was becoming necessary for manufacturing the herbicide Pyrazon would not be built in Antwerp, although the quandary about the amount of salt created by this process would have been easier to solve on the North Sea than at the confluence of the Rhine and Neckar.⁴⁵¹ Ludwigshafen was chosen instead because the chlorine-laden waste liquors of the two plants were not easily biodegradable, and the special incinerator needed for burning them could be used to greater capacity in Ludwigshafen. Other organically polluted wastewater was to be channeled to the sizable treatment plant just finished. The enormous amounts of waste sulfuric acid could also be neutralized in Ludwigshafen’s existing cracking plant. The decision also stemmed from the fact that the general character of the Ludwigshafen production plants as an interlocking system offered better conditions for coping with the wastes occurring with the mass accumulation of these dangerous substances. Despite their concentration, it remained uncertain for the moment whether BASF was to be classified as a highly hazardous industrial plant. The Federal Ministry of the Interior wanted to prohibit flights through the air space over the works, but in Ludwigshafen it was considered “unwise” to “call attention to itself in this context.”⁴⁵² However, this point about the Ludwigshafen site was a salient, if tacit, factor when BASF began planning for the nuclear power plant in 1968.

Environmental problems played only an indirect role in BASF’s siting decisions in Europe during the expansive 1960s. Locating Basant on the North Sea, for example, facilitated disposal of vast amounts of salt and gypsum. The authorities in Europe courted industrial settlements, and the population welcomed the strengthening of the labor market. Environmental protests – such as those against the discharge of large quantities of gypsum into the Scheldt River – did not begin until the mid-1980s (and by 1994 had forced the company to reconceive its process for manufacturing Nitrophoska).⁴⁵³ By that time, though, BASF was well experienced with this phenomenon. Like so much else, it had first appeared in the United States, where by the late 1960s BASF had already encountered less than absolute support. In September 1969, the company purchased nearly three square miles of land on the south bank of the Colleton River near Port Victoria in South Carolina. It first planned to invest DM 400 million there to manufacture dyestuffs and polystyrene. Governor Robert E. McNair enthusiastically welcomed the settlement in Beaufort County, an impoverished region with high

⁴⁵¹ AZ – Central Planning, Pyrazon plant II/Siting alternative Ludwigshafen/Antwerp, November 27, 1975, attachment 1 to 35/75; BASF RA, minutes of the managing board.

⁴⁵² Minutes of the managing board meeting of March 16, 1964; BASF RA.

⁴⁵³ BASF Antwerp, Chemie, p. 117.

unemployment among the Black population, but ran into protest from numerous nature conservationists and wealthy retirees who had their retirement homes in the neighborhood. The resistance escalated into three lawsuits filed by fishermen who feared that the prospective plant's chemical production would compromise the water quality in the area. They were supported by President Nixon's Secretary of the Interior Walter J. Hickel who also noted the danger of tanker accidents and turned down the import quota for which BASF Corporation had applied.

By April 1970, it was therefore clear to Timm that the BASF Group had fallen "into a most unfortunate situation by having become the focus of an American domestic discussion about pollution."⁴⁵⁴ He addressed three questions to the responsible members of the managing board, Danz and Ludewig, who could only answer "no" to all three. No, it was not possible to arrive at a "final judgment" about the profitability of production at Port Victoria. No, it was not certain that better sites might still be available, including a tract of the newly acquired Wyandotte Chemicals Corporation in Geismar. In fact, a preliminary study of the site had already concluded that Port Victoria was the worst of all conceivable variants.⁴⁵⁵ Lastly, and most decisively, no, it was not possible to overcome the wastewater issue in Victoria Bluff. The dyestuff project involved the disposal of 80,000 tons of neutral salts a year, a load beyond the carrying capacity of the Colleton River, which in truth was a coastal inlet subject to the tides. The managing board therefore quickly agreed to give up on Port Victoria once and for all as a site for the construction of a chemical plant. BASF's only concern now was "to retreat with a minimum loss of face."⁴⁵⁶ Simply forbidding "mention of the name Port Victoria in the factory newspaper"⁴⁵⁷ was not enough; the public had not yet even heard of Victoria Bluff. The project was "suspended" and elegantly eliminated as a side effect of the merger of BASF Corporation and Wyandotte into BASF Wyandotte, for one thing was clear: "a retreat from Port Victoria, if necessary, could be concealed with the merger."⁴⁵⁸

Minor exceptions aside, such defeats did not typify the reality of environmental policy either at existing sites or at the highly compact parent works. No project failed because of official approval being denied or because of prohibitive conditions being imposed.⁴⁵⁹ But after the experience with Port Victoria, Ludwigshafen knew that a new chapter had begun in the history

⁴⁵⁴ Minutes of the managing board meeting of April 2, 1970; BASF RA.

⁴⁵⁵ Frisch [manager in the central office] to Erich Henkel [head of BASF's USA business], "betr. Vorläufige Ergebnisse der Standortstudie USA," March 31, 1970, attachment 4 to 16/70; BASF RA, minutes of the managing board.

⁴⁵⁶ Minutes of the managing board meeting of April 2, 1970; BASF RA.

⁴⁵⁷ Minutes of the managing board meeting of March 2, 1970; BASF RA.

⁴⁵⁸ Minutes of the managing board meeting of March 9, 1970; BASF RA.

⁴⁵⁹ BASF to the Association of the Chemical Industry, "betr. Probleme und Schwierigkeiten im Zusammenhang mit dem Genehmigungsverfahren nach den §§ 4 und 15 BinnSchG [Inland Waterways Act]," April 10, 1981; BASF UA, R 83/03. See also section 9 for information on

of the chemical industry. BASF developed a flexible strategy that included the closure and shedding of environmentally dubious installations. In 1982, for example, the company shut down its naphthol factory, which had existed since 1878, because the primary dyestuff product manufactured there incurred excessively high costs for the construction of exhaust-air processing plants and the operation of the water-treatment plant.⁴⁶⁰ "For purely operational reasons," BASF also dropped plans in 1987 to build a plant for the production of adipic acid, but the protest against rising levels of noxious emissions surely contributed to this decision.⁴⁶¹ Extremely toxic substances, such as dioxin, were avoided in Ludwigshafen as soon as it was recognized how dangerous they were. In November 1953 a runaway chemical reaction released 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, later known as Seveso poison. Employees fell ill with chloracne. Production was shut down the same year and the building was later demolished. It was not until 1957 that the cause was identified as dioxin, the substance that put the chemical industry at the center of the environmental discussion after 1976. To strengthen "self-responsibility," Hans Albers, who succeeded Seefelder as chairman of BASF's managing board, developed Timm's course of tactical flexibility further by declaring environmental protection as an "independent duty of all plants" that goes "beyond the purely economic aspect," making it a managerial function at all levels.⁴⁶² The nexus of an effective strategy for overcoming pollution, however, was the system of tightly integrating different lines of production and technical infrastructures. It allowed BASF to take the nearly 2 million tons of production waste and make raw materials from 48 percent of it, to avoid or reduce another 35 percent of the residue, and to use 13 percent as a source of energy. Today, only 4 percent has to be disposed of as unproductive material.⁴⁶³

7. LEARNING FROM THE UNITED STATES? FROM JOINT VENTURE TO VERBUND

Staying Power: Joint Venture with Dow

Although BASF's foreign business had hit its stride again since the Korean War, business with the United States lagged far behind development in Europe and Brazil. This divergence owed partly to the protectionist spirit of

the events surrounding the construction of a genetic engineering plant at the Ludwigshafen site in the early 1990s.

⁴⁶⁰ Country area BASF Ludwigshafen, Naphthol: Production costs outstrip market prices, April 14, 1983; BASF, R 83/03.

⁴⁶¹ "BASF gibt nach: Keine Adipinsäure-Produktion" [BASF yields: No adipic acid production], *Mannheimer Morgen*, October 29, 1987, p. 1.

⁴⁶² Albers to the members of the directorate meeting, December 19, 1986; BASF UA, C 13.

⁴⁶³ BASF, Avoidance, recycling, and disposal of residues, 1994; BASF UA, R 8304 environmental protection, reports since 1989.

Washington's foreign trade policies, but it also stemmed from the fact that BASF had practically no sales and marketing infrastructure at all in the United States until 1954. For the entire North American market, the company relied on the services of a "private" sales representative, a Herr Naumann, whose relationship with BASF was not legally defined in a specific way. Little changed in this arrangement when BASF decided in October 1954 "to create a small company in New York – tentatively called 'BASF Inc.' – as quickly as possible with a few thousand dollars in capital as a framework for Herr Naumann's activity in the USA."⁴⁶⁴ The shares of the new service company were taken over initially by a "first-class New York law firm," Gilbert B. Kerlin, as trustee for BASF.

Since the resumption of regular exports, however, the actual selling of the dyestuffs lay with Nova Chemical Corporation, which belonged to the brothers C.A. and R.H. Funke. Nova was instructed to gradually phase out the sale of no-name BASF products in order to sell them under BASF brand names and trademarks. But Nova did not operate profitably enough to serve as a forward position for recapturing something as important as the North American market. Nor did the enterprise lend itself to successful entry into the production of helizarin dyestuffs and pigment binders, which became necessary because their import from Ludwigshafen had "encountered growing obstacles."⁴⁶⁵ To shape its U.S. transactions directly, BASF founded a new enterprise for dyestuffs in April 1957, the Putnam Chemical Corporation. It had capital of \$250,000, of which 80 percent came from BASF and 20 percent from the Funke family. Two years later, BASF exercised its option to buy the Funke shares, giving it and its holding company – BASF Overzee N.V. in Curaçao in the Netherlands Antilles – control over all the shares in the business.⁴⁶⁶ Nova was liquidated, and Putnam took over its personnel and rented a small factory site in Beacon, New York, where the manufacture of dyestuffs and binders was launched with BASF processes in the summer of 1958. The principal customers were the Dow Chemical Company and the joint venture that BASF and Dow had just founded, the Dow Badische Chemical Company (DB) in Freeport, Texas.⁴⁶⁷

The roots of the relations to the enterprise founded by Herbert H. Dow in 1897 date back to Timm's first trip to America in late 1949 and early 1950. At that time, Dow Chemical had invited Timm to tour several of its sites, including Freeport; Pittsburgh, California; and headquarters in Midland, Michigan.⁴⁶⁸ Whereas the potential for petrochemical cooperation with Shell

⁴⁶⁴ Minutes of the managing board meeting of October 9, 1954; BASF RA.

⁴⁶⁵ *Geschichte der Rechtsabteilung der BASF. Von der Gründung bis 1967*, Part V (March 28, 1953, through December 31, 1958), p. 30; BASF UA, B 101.

⁴⁶⁶ Ibid., Part VI (1959), pp. 9–10, BASF UA, B 101.

⁴⁶⁷ Minutes of the managing board meeting of April 16, 1957; BASF RA.

⁴⁶⁸ Timm, Diary of the First Trip to America, late November 1949; PAT.

impressed him, he was fascinated by the similarity between BASF and Dow production processes. In styrene and ethylene chemistry, for example, they matched “our own down to the details.” Dow’s sphere of business, like BASF’s, rested on a broad array of raw materials, giving the company firm footing on the market for basic chemicals. Except for only a few areas, Dow did not extend its operations to the final links in the chain of value added, preferring instead to focus on its strengths in research and development.

The contacts from 1949 and 1950 lasted. In March 1957 Timm paid Dow a second visit, this time on official business. Plans now took shape to transform the exchange of know-how, which had so far been confined to individual processes, into a more durable sort of cooperation.⁴⁶⁹ In Ludwigshafen, Dow emissaries and Reppe had already closely examined the possibilities inherent in the idea of combining his concept of acetylene chemistry with the new raw materials base consisting of natural gas and naphtha.⁴⁷⁰ In the summer of 1956, BASF was evidently determined to participate in the joint plant in the United States in the acrylics sector, for it was decided to finance this venture by means of foreign credit “to be paid back in about four or five years with earned licensing fees and dividends.” To help procure the loan, Heintzeler recommended “engaging a BASF subsidiary in Curaçao as a holding for the participation and as obligator of the foreign loan.” The dual tax treaty between the United States and the Netherlands, which applied to the Netherlands Antilles as well, minimized the tax burden in both countries.

The \$7 million in costs estimated by Dow in the opening negotiations in the United States seemed excessive to the BASF engineers, but one year later Ludwigshafen had to reckon with “plant costs in the range of \$11 million.”⁴⁷¹ Within that year, the profitability of the project had significantly deteriorated on the earnings side of the equation, too. Meanwhile, several American chemical companies had plans to market acrylic products, so the price calculated with the joint venture in mind was most likely untenable. Ludwigshafen decided on principle to go ahead with the venture anyway. There was “concurrence that a BASF joint venture with a firm like Dow was worth pursuing and that BASF’s decision on the project must therefore not be made solely from the vantage point of profitability.”⁴⁷² Reppe was so convinced of the merits of his process that he thought it still possible to achieve “satisfactory profitability after the project has been thoroughly worked through together.” Sufficient remunerability was necessary if only because the plan to finance the venture through foreign loans appeared dubious without it. “Given the profits from acetylene and alcohol and given the interest in BASF’s process,” the advantages for Dow also seemed obvious,

⁴⁶⁹ Minutes of the managing board meeting of March 27, 1957; BASF RA.

⁴⁷⁰ Minutes of the managing board meeting of July 16, 1956; BASF RA.

⁴⁷¹ Minutes of the managing board meeting of March 27, 1957; BASF RA. ⁴⁷² Ibid.

especially since Reppe was willing to reveal details of his process even before the contract had been concluded.

During the negotiations on the joint venture in the acrylics sector, it came out that Dow intended to sign a multiyear supply contract for styrene monomer from the Hüls Chemical Works and to license Hüls to produce various kinds of polystyrenes.⁴⁷³ A link between the market leader and Hüls could only be "very unpleasant" for BASF, particularly since BASF itself was interested in using "certain special brands" of Dow's. After BASF stated its willingness to conclude a five-year contract to deliver monomeric styrene and to compensate Dow by transferring know-how, Dow broke off negotiations with Hüls and extended the cooperation with BASF to this sector of the plastics market as well. BASF reciprocated by reducing its licensing fee from 7½ and 7 percent to 6 percent for the joint venture in the acrylics sector. The corporate charter of DB, which was founded on April 2, 1958, stipulated that the two parent companies were each to contribute \$3 million: \$1 million for the subscription of the shares and \$2 million for the shareholder loan. Beyond these measures, BASF Overzee took out a 15-year investment loan with the Mutual Life Insurance Company, marking the first time that it concluded an American contract "that is highly unsatisfactory by European standards."⁴⁷⁴ Nonetheless, the sales, banking, and legal departments all recommended "conducting a practical experiment with American loan possibilities by taking on the credit." The licensing agreement defining the company's area of work was likewise concluded between DB and Overzee after BASF had granted a license to its Caribbean subsidiary for this purpose. The whole idea of the joint venture was to have BASF bring in its know-how and to have Dow provide its marketing expertise and much of the management. The American partner, whose plants in Freeport neighbored DB, partly saw to the supply of raw materials and to the selling of the products. The joint venture commenced production of acrylic acid and acrylates in 1960 upon completion of the first construction phase. Production of butanol began a year thereafter, and another year later caprolactam was added to the production program.

Inclusion of the precursor for perlon, one of BASF's technological and economic trumps in competition on the markets for fiber raw materials and plastics, was an important moment in the relations between the partners. It unmistakably demonstrated the continual improvement in the quality of their cooperation. Ludwigshafen had a "clear technological lead" in the manufacture of caprolactam and, with steadily growing capacity, was emerging as one of the main producers in that area. When negotiations for having the joint program encompass fiber raw materials opened in Midland in May 1959, BASF therefore insisted first on secrecy agreements intended to

⁴⁷³ Minutes of the managing board meeting of April 16, 1957; BASF RA.

⁴⁷⁴ Minutes of the managing board meeting of November 17, 1958; BASF RA.

facilitate candid discussion.⁴⁷⁵ When the matter became acute, BASF was nevertheless reluctant to commit itself under any circumstances to disclosing everything it knew, "even if this refusal were to induce Dow to abandon the caprolactam project with DB."⁴⁷⁶ All the parties involved, though, must have been aware that it was impossible to keep the process secret for long in a company whose personnel came chiefly from Dow. BASF was manifestly ready to accept this reality in the interest of long-term cooperation.

On the other hand, the caprolactam issue confronted BASF with a severe dilemma concerning the development of its own American subsidiary. Building a viable caprolactam plant would have provided the basic unit for a big production complex of BASF's own. But the modest size of the Putnam Chemical Company made the cost of such a project appear far too great a risk to undertake alone. The dyestuff subsidiary (whose name was eventually changed to BASF Colors & Chemicals, Inc. [BCC] and whose head office was transferred from New York to Charlotte, North Carolina) did not even come close to covering its costs. It would have had to double its sales of dyestuffs to break even.⁴⁷⁷ Even the acquisition of United Cork Companies in South Kearny, New Jersey (1963), which had been producing and processing Styropor under BASF license since 1955, did little to change BCC's need for enormous infusions of capital, as was the case with the expansion of BCC's caprolactam capacity in 1965.⁴⁷⁸ In any case, the continued development of DB was a better deal for Dow, provided Dow exercised its contractual sales monopoly. The American partner was entitled to a license fee of 5 percent for its sales performance anyhow.⁴⁷⁹ In Ludwigshafen's eyes, this arrangement was completely justified, for BASF had "no sales experience on the remarkably difficult American market."⁴⁸⁰ This reason alone ruled out the idea of going it alone in caprolactam production as a way of helping the financially strapped BCC to reach the critical mass for self-survival on the market.

Caught Together, Hanged Together: Entering the Fiber Business

All considerations of whether and how long Dow and BASF both benefited from cooperating on the scale agreed thus far were overshadowed by new plans that, as things stood, could succeed only if the partners worked together. Since 1962 BASF had played with the thought of embarking on forward integration in the fiber business, too. In view of the traditional division

⁴⁷⁵ *Geschichte der Rechtsabteilung der BASF. Von der Gründung bis 1967*, Part VI (1959), p. 10; BASF UA, B 101.

⁴⁷⁶ Minutes of the managing board meeting of November 2, 1959; BASF RA.

⁴⁷⁷ Minutes of the managing board meeting of June 4, 1962; BASF RA.

⁴⁷⁸ Minutes of the managing board meeting of February 15, 1965; BASF RA.

⁴⁷⁹ Minutes of the managing board meeting of February 1, 1960; BASF RA.

⁴⁸⁰ Minutes of the managing board meeting of November 18, 1965; BASF RA.

of labor, this idea seemed feasible only in concert with BASF's best customer on the market for fiber primary products: Vereinigte Glanzstoff-Fabriken AG (VGF), a fiber maker in Wuppertal. In discussions with Ernst Hellmut Vits (the head of VGF) and Hermann Josef Abs, who was on VGF's supervisory board, Wurster therefore first tried to explore the possibilities of having the two companies work closely together on manufacturing fiber.⁴⁸¹ Although VGF was "sympathetic" to BASF's thought of a participation, the consent of its major shareholder, *Algemene Kunstzijde Unie N.V.* of the Dutch AKU Group, was "the thorny crux of the problem." Nevertheless, Wurster was persuaded "that our participation in fiber manufacturing is a done deal, if at all possible with, if necessary without, VGF."

In the negotiations, which dragged on until mid-1964, BASF's minimum objectives were to establish close contractual supply links, set up joint research for fiber raw materials and synthetic fibers, and acquire a 25 percent minority stake "in order to achieve longer-term security of our investments and to tie VGF more solidly to BASF than is possible solely through a supply contract and joint research."⁴⁸² A greater stake, which would have been inherently desirable, did not seem attainable even with fundamental approval from AKU. BASF also wanted to introduce the principle "that the manufacturing and processing of raw materials for new products take place in a 50:50 joint venture."⁴⁸³ Setting out from these premises, the negotiations turned out disappointingly for BASF, which was not permitted a participation in Glanzstoff, not even a minority stake. The intention was to develop cooperation in the area of synthetic fiber primary products and their processing into fibers, but "each instance [was to be] determined and spelled out in writing."⁴⁸⁴ Nonetheless, the contracts for supplying AH salt (100 percent), caprolactam (85 percent), and dimethyl terephthalic acid (80 percent) were expanded and were extended until the end of 1980. Lastly, the two rivals agreed to consult with each other if BASF should forward integrate in Western Europe or AKU/Glanzstoff should backward integrate. BASF had thus not only failed to find the industrial partner it needed in order to pursue its own forward integration strategy but had also sacrificed some of its own entrepreneurial maneuvering room, at least in Western Europe.

This outcome made it more crucial than ever to take cooperation with Dow into the processing stage as well. Outside Europe, practically the only suitable place to participate in a spinning factory was the United States.

⁴⁸¹ Minutes of the managing board meeting of March 5, 1962; BASF RA.

⁴⁸² Michael Hann [head of the fiber raw materials division], file note (strictly confidential), "betr. Beziehungen zwischen VGF und BASF Besprechung am 11. Juli 1962," July 13, 1962, attachment to 23/62; BASF RA, minutes of the managing board.

⁴⁸³ Minutes of the managing board meeting of July 24, 1962; BASF RA.

⁴⁸⁴ Steinhofer, Heintzeler, the crucial points in the negotiations with AKU/Glanzstoff, attachment 8 to 15/64, BASF RA, minutes of the managing board.

After all, it was important for BASF to have a certain amount of its own experience in order “to gain and hold its position in the overall fiber raw material business in the long run,” so it had to participate in a spinning factory in the United States.⁴⁸⁵ That opportunity came in early 1964, when the Beaunit Mills spinning plant went up for sale for approximately \$70 million and Dow offered to invest a further \$56 million to construct a DB plant for manufacturing and processing AH salt, an input for nylon.

Individual members of BASF’s managing board argued strenuously against such a decision. Magener warned of investment burden in Europe during the next four years, concluding that “caution with commitments abroad is in order.” Freiensehner concurred and stressed the doubtful profitability of the AH salt project. At a time when DB “had not yet gotten over its substantial early losses,” it seemed highly improbable that Beaunit-DB would generate any returns. Moreover, Freiensehner had reservations about “whether the current technological resources of BASF and Beaunit were genuinely sufficient to guarantee the construction and operation of an AH salt spinning factory also for fine fiber weights* in a country several thousand kilometers away.” He demurred, questioning “whether we could supply the required key personnel in numbers great enough to really gain transferable spinning experience.” Timm, seconded by the head of sales, Klaus Schönfeld, expressed skepticism, too, for the business centered chiefly on textiles, which was an utterly unfamiliar field to BASF and “the most hotly contested market with the most unscrupulous methods.” When Wurster, Ludewig, and Saftien finally joined in by emphasizing the “extraordinary risk” and raising the fear “that the financial commitment [was] wholly out of proportion to the know-how expected [to be gained] from forward integration in the USA,” the fate of the project in the managing board seemed sealed.

Heintzeler and Steinhofer, however, succeeded in staving off a decision by deeming the risk modest “in view of the likely development of index” for synthetic fibers. They underscored the lack of any alternative to the project and saw the future of the cooperation with Dow in jeopardy if the board did not go along. Heintzeler assumed that Dow would enter the business of synthetic fibers in the USA in grand style regardless, sooner or later relegating DB to a role as a “small appendage of Dow’s synthetic fiber business.” DB, they argued, would inevitably be “booted out” and would thereafter be reduced to an episode that would only have helped strengthen Dow, the rival. The board decided to “continue negotiating cautiously” and give Dow equally “cautious” interim notice.

By November 1965 the concern was still so unsettled that BASF kept all options open. The managing board did approve the purchase of a new plant

⁴⁸⁵ Minutes of the managing board meeting of March 2, 1964; BASF RA.

* Measurable in deniers (weight in grams of 9,000 meters of fiber), a system employed internationally.

for \$7,525,000 to manufacture polyamides from caprolactam in the United States. But because it was unsure whether BASF would undertake the project alone or in the framework of DB, the name of the final buyer had to be left blank.⁴⁸⁶ Internally, too, the dispute over the sense of the involvement in fibers raged on. Hans-Joachim Pistor, the division director relevant to the issue, came out vociferously in favor of moving into fibers and even wanted to think about purchasing the Hamburg spun fiber manufacturer Phrix AG as quickly as possible whether or not BASF entered the fiber field in the United States. The sales director for fibers, Hans Oesterlin, countered by arguing for new exploratory talks with AKU/VGF, especially since he believed "that Phrix, in its current form, is not an attractive company."⁴⁸⁷ However, the die had been all but cast. Magener reported "on the different ways that BASF could try to acquire a controlling interest in Phrix." Although much doubt still lingered about the economic and technological soundness of the spun fiber factory, the BASF managing board was evidently only too willing to remove them in order to gain a controlling interest "at tolerable conditions." The move also settled the matter of whether to expand the joint venture with Dow into fiber processing, with Freiensehner accentuating again "that BASF's sales setup is unable to cope additionally with the fiber business, which is totally different from the chemical business."⁴⁸⁸

At that point another problem capable of torpedoing the project cropped up. The antitrust suit brought by the U.S. Justice Department in April 1964 against the Mobay Chemical Company, a creation of Monsanto and Bayer, made it plain that American courts saw joint ventures by rivals as a restraint of competition on principle. After the Supreme Court's 1964 landmark decision on the sodium chlorate producer Penn-Olin Chemical Company, the threat of a ban hung like a sword of Damocles over all similar kinds of co-operation. The highest U.S. court had decided for the time being that joint ventures exclude each partner's potential competitors and thus violate the Sherman Antitrust Act of 1890 and the Clayton Act of 1914.⁴⁸⁹ Even after seeking the official opinion of an antitrust specialist, BASF's own legal advisors feared that "Dow Badische lay squarely in the danger zone."⁴⁹⁰ BASF shied away from a solution that would be legally safe but commercially pernicious.

But judging the new situation after the joint venture's commencement of fiber production, the experts on competition law at the Shearman & Sterling law office gave an all-clear. Although even they did not want to preclude the

⁴⁸⁶ Minutes of the managing board meeting of November 8, 1965; BASF RA. ⁴⁸⁷ Ibid.

⁴⁸⁸ Minutes of the managing board meeting of November 18, 1965; BASF RA.

⁴⁸⁹ In 1967 the same court revised the decision by a vote of four to four because there were many indications that neither partner would have entered the market without the cooperation of the other. See Gellhorn, *Antitrust Law*, pp. 342–3.

⁴⁹⁰ Minutes of the managing board meeting of December 21, 1964; BASF RA.

possibility of an investigation by antitrust authorities someday, they considered DB, particularly with its new area of work, to be on solid ground from the antitrust standpoint even if the Supreme Court's principles were strictly applied.⁴⁹¹ The report from Shearman & Sterling rested on the assumption that Dow would not have succeeded for long on the market had it gone forward alone with its small, high-loss polyacrylonitrile (PAN) fiber production. The company would probably even have been compelled to liquidate "the entire PAN adventure" had it not teamed up with BASF, which could help extend the production program to the three most important types of fiber – polyamide, polyester, and PAN. As for BASF, the commercial lawyers knew very well that the company would never have risked entering the fiber business without an American partner. The German company had no large-scale technological experience in producing fiber, let alone selling it on the American market, or even in Europe. Given these facts, no one could reasonably argue that the cooperation between the two enterprises would interfere with competition on the American fiber market. On the contrary, DB's advance into the market for synthetic fibers brought another competitor into the field who would otherwise not have been present. The antitrust attorneys, however, strongly urged that DB be made a fully integrated new business unit with its own sales organization for all its products because it would then avoid collision with the Sherman Antitrust Act. This call echoed an earlier one by BASF, so the antitrust danger greatly buttressed the company's negotiating stance. Wavering to the very last on whether to hazard the venture into the American fiber market, BASF found it easy to push the negotiations to the brink of failure. This position, too, gave BASF certain advantages, which the expansion-minded Americans accepted but took as breaches of the spirit of partnership.

The Dow Chemical Company brought its own PAN fiber production plant in Williamsburg, Virginia, into the joint venture. DB therefore transferred its headquarters from Freeport to Williamsburg, but its new main factory for the production of nylon fibers and polyester fibers was supposed to be built from scratch in Anderson, South Carolina. It began operations in 1968, after the U.S. Department of Justice had agreed to Monsanto's sale of half of the Mobay shares to Bayer in 1967 and had simultaneously relaxed its legal policy against joint ventures. Henceforth, the intention was to act only if the market shares of the participating companies was relative large, usually more than 8 percent. "With very few exceptions, [DB had] nowhere near that much" of the market.⁴⁹² Nevertheless, DB had anticipated possible dangers

⁴⁹¹ Heintzeler, Aktennotiz "betr. Faserprojekt Dow Badische/Antitrust-Gesichtspunkte," January 20, 1966, attachment 3 to 5/66; BASF RA, minutes of the managing board.

⁴⁹² Hans Lautenschlager, BASF Colors & Chemicals Inc., to Freienschner on February 14, 1967; BASF RA, file on antitrust USA, miscellaneous documents January 1, 1965, through December 31, 1967.

by marketing its products for the first time through its own sales offices in New York, Chicago, Williamsburg, Greenville, Atlanta, and Houston.

The new phase of cooperation was ill starred from the outset, however. The ink on the contracts had not dried before one of the underpinnings for calculation started to crumble. The anticyclical economic policies of the Nixon administration suspended all existing subsidies for new investments, cutting DB's profit by at least \$11 million.⁴⁹³ The construction of the factory received no support from South Carolina municipal bonds, either, an otherwise customary, very favorable source of financing for new industrial settlements in the United States. Anderson was "an optimal site from every other angle," though, so the drawbacks had to be taken in stride. Still, such setbacks were hardly suited to lifting the mood of the partners. Disagreement over the tax valuation of Dow's Williamsburg investment and a persistent internal row about the fees and timing of fiber licenses did their part to keep the atmosphere tense. It was already apparent that DB would have to "pass through a zone of heavy losses" until at least 1970. The partners had not seen a single dollar of profit since the joint venture was founded in 1958. Twelve lean years were a bit much even for the long-term thinking of German entrepreneurs, not to mention the much briefer operational rhythms to which members of Dow's top management were accustomed.

By the time the fiber contract was concluded in early 1966, the situation foisted distrust wherever BASF and Dow representatives faced each other – the control organs, in which the parent companies had an equal number of seats, and in DB's leadership team, which consisted of managers from both sides. The biggest bone of contention was the duration of the royalties for fiber production know-how. BASF was entitled to most of them. They were supposed to begin flowing to the licensors in 1968 and were to continue for 15 years. In response to Dow demands exceeding this agreement, BASF finally compromised by settling to wait for the first payments until 1970 and waiving the contractual stipulation that stores of raw materials from the old PAN fiber plant in Williamsburg had to be transferred to DB. With this "conciliatory arrangement," Ludwigshafen hoped to have laid the groundwork for "steadfastly resisting further impositions of a similar sort by Dow."⁴⁹⁴

Conflicts of interest caused strife over DB's financing, too. Dow preferred a low debt-equity ratio. Overzee wanted instead to take on credit in the United States and pass it on to the BASF associate companies as back-to-back loans.⁴⁹⁵ The Basfin Corporation, which had been founded specifically for this purpose, agreed with Overzee. The debt for the American market was to remain outside the accounts of BASF AG and not inflate the parent company's burgeoning debt. The compromise that Dow and BASF finally settled on committed each to bring in \$30 million of equity capital and

⁴⁹³ Minutes of the managing board meeting of September 16, 1966; BASF RA. ⁴⁹⁴ Ibid.

⁴⁹⁵ Minutes of the managing board meeting of January 31, 1966; BASF RA.

an equal amount in shareholder loans by 1968 at interest slightly more than market rates, which Basfin had to pay to U.S. insurance companies for credit.⁴⁹⁶ Even so, the antitrust issue had its impact. Approval of the loan was delayed because “at the last minute the creditors requested an official opinion from Shearman & Sterling that Dow Badische is not exposed to any antitrust dangers à la Mobay.”⁴⁹⁷

The distrust felt by the “Dow gentlemen” was not limited to cooperation in the United States. Long before BASF’s interest in the Hamburg spun fiber producer became a daily topic of conversation at the stock exchanges in Germany, the Ludwigshafen managing board recognized “that Dow was intently registering all news and rumors coming from Europe about Phrix,” and that Dow’s top management exuded “an underlying distrust of BASF in this regard, too.”⁴⁹⁸ Dow had just recently founded Lurex N.V. Amsterdam with the branch plant Lurex U.K. Ltd. in King’s Lynn, Norfolk, and had offered to transfer half of the stake in this manufacturer of stylish high-gloss polyester fibers to BASF Overzee.⁴⁹⁹ Dow thus followed the spirit, if not the letter, of the joint-venture agreement, which obligated the partners to work together in trust in the fiber area.

The same expectation was now entertained in Midland as well with respect to a commitment that BASF was obviously about to enter into with its customer Phrix AG. But nothing at all had been decided in Ludwigshafen at that time. It was not until shortly before the end of the year that Magener and Heintzeler pressed the managing board to state “whether it makes sense to continue watching the development at Phrix or whether BASF should finally declare its disinterest” in purchasing the company.⁵⁰⁰ After thorough discussion the managing board decided to keep the acquisition of Phrix in mind and began acting on it immediately by buying a majority of the shares. Just a few days after Phrix AG had been integrated into the BASF Group, the heads of BASF, Dow, and DB met to discuss the impacts of this transaction on the substance and scope of the transatlantic partnership.⁵⁰¹ The American side was quite keen on taking over half of the new holding, particularly since the Phrix subsidiary Neumünstersche Maschinen- und Apparatebau GmbH (Neumag) had had close ties with DB even before the acquisition. (Neumag had built most of DB’s new facilities.) Dow’s intention to enter into a new joint venture with BASF in the second half of 1968 triggered hectic activity in BASF, which wanted to ensure “that Phrix is interspersed with BASF-oriented persons at this time, just as Dow Badische is interspersed

⁴⁹⁶ Minutes of the managing board meeting of September 16, 1966; BASF RA.

⁴⁹⁷ Minutes of the managing board meeting of January 9, 1967; BASF RA.

⁴⁹⁸ Minutes of the managing board meeting of September 16, 1966; BASF RA.

⁴⁹⁹ Minutes of the managing board meeting of January 20, 1966; BASF RA.

⁵⁰⁰ Minutes of the managing board meeting of December 19, 1966; BASF RA.

⁵⁰¹ Minutes of the managing board meeting of March 13, 1967; BASF RA.

with Dow-oriented persons.”⁵⁰² Ludwigshafen did not feel this presence to be necessary in order to keep the Phrix management from adopting excessively independent policies after conversion into a 50:50 company and to integrate it into BASF’s overall fiber interests.

Nor was BASF disinclined to pass on half of the risk to Dow, for it soon became clear that the new subsidiary’s chances on the market were none too good. BASF itself had set the level of the balance-sheet loss that the Hamburg company was to show for 1967. A slight negative result was supposed to enhance the optical maneuvering room for future growth. The nosedive in 1968 was therefore especially surprising: a cash loss of DM 10 million in the sector for viscose staple fibers and a total loss of DM 28 million.⁵⁰³ Even after the negotiators’ agreement of October 1967, the negotiations on the German joint venture dragged on until the fall of 1968, so the accelerating descent into the red could not have stayed hidden from Dow. Evidently, the decision makers in Midland, as in Ludwigshafen, expected even an ailing Phrix to have enough potential to serve as a springboard for the European fiber business. In return for willingness to accept burden sharing, however, the Dow managing board wanted BASF to go a long way to help finance the transaction. After all, the U.S.’s deteriorating situation with foreign exchange discouraged direct investment in Europe.

These general weather conditions of monetary policy, combined with Phrix’s gloomy outlook for sales of cellulose fibers, brought the project to the brink of failure in the summer of 1968. At the eleventh hour Dow retracted the text of a contract that BASF had assumed was “already a negotiated agreement.”⁵⁰⁴ The Americans now demanded from Ludwigshafen nothing more and nothing less than the crediting of the entire DM 164 million required for the purchase of the Phrix shares – for a period of 10 years. Deeply shocked, Timm let his colleague Herbert D. Doan know that this move gave reason “to reconsider the fundamental idea of our cooperation.” Dow was BASF’s toughest competitor on the world market, and Timm did not know how to explain to the German public why BASF should help finance what was bound to make Dow even stronger. Suspicion would arise that such assistance was not about supplying Phrix with fresh external money for future projects but rather about covering up efforts to turn the frail subsidiary around with BASF resources. Although Dow had offered to grant an equal level of funding as a back-to-back loan for BASF projects in the United States, Timm saw himself unable to find ways to use this assistance in the foreseeable future. In September 1968 tedious negotiations finally led to a compromise

⁵⁰² Minutes of the managing board meeting of May 16, 1967; BASF RA.

⁵⁰³ Minutes of the managing board meeting of December 4, 1967; BASF RA.

⁵⁰⁴ Timm to Herbert D. Doan, President, The Dow Chemical Company, August 9, 1968, attachment 4 to 27/68; BASF RA, minutes of the managing board.

that established the principle of back-to-back loans of an initial DM 24 million and DM 58 million later, going halfway toward satisfying Dow's interests. Dow promised to raise the remaining DM 82 million on its own but felt itself obliged "to put BASF on notice" that it could have trouble with financing Phrix at some juncture because of U.S. currency regulations.⁵⁰⁵ Dow and BASF hoped to make a clean break with the misunderstandings there had been on both sides during preparation of the participation agreement. In an overriding agreement, the partners consolidated all three joint ventures (DB, Phrix, and Lurex) when Dow joined Phrix AG in November 1968, as Shearman & Sterling had recommended for reasons of competition. The joint venture with Dow thereby took on ever greater dimensions to outsiders, but its internal cohesion continued deteriorating, a demise that had set in with the foray into the fiber business.

After Phrix's situation seemed to stabilize in the first half of 1969, the tension within the German-American fiber venture shifted back to the United States. Given the splendid profits of BASF AG and the "impression of the group's downright alarming growth," it was all the more confounding that the figures were "declining sharply" not only at DB and Lurex but at BASF Corporation as well.⁵⁰⁶ DB's losses were so high that the aggregate profit level of BASF's foreign production companies was very "disappointing." A country-by-country review was particularly depressing: "Although we have had business operations in the United States for more than twelve years, this entire area still constitutes a loss zone." In principle, things in Brazil were judged similarly, for "no profit has been transferred to this very day." There, however, it had at least been possible to build up the sizable turnover of DM 160 million from the company's own production units. In view of the "worrisome loss trend" at DB, BASF's managing board became increasingly afraid that Dow could follow the "ruthless practice of large American corporations" and shed companies "from which no satisfactory returns are likely in the foreseeable future."⁵⁰⁷ The board asked itself the same question, but, taking a longer-term perspective, answered it affirmatively. The corporate strategy of BASF's top leaders was to survive on the market until 1980, by which time there would be only a few giant manufacturers of synthetic fibers left on earth. The only doubt was whether the DB-Phrix Group would be one of those that survived and succeeded. One year before the collapse of Phrix AG, the BASF managing board firmly believed the subsidiary would make it.

⁵⁰⁵ Jürgen von Knieriem [employee in the legal affairs department], file note "betr. Dow/Phrix: Besprechung in Ludwigshafen am 10.9.1968," September 11, 1968, attachment 1 to 31/68; BASF RA, minutes of the managing board.

⁵⁰⁶ Report on the situation of the BASF Group at mid-year 1969, attachment 1 to 20/69; BASF RA, minutes of the managing board.

⁵⁰⁷ Minutes of the managing board meeting of July 7, 1969; BASF RA.

The low capacity at which DB was operating could still be explained by "startup difficulties" causing losses in the nylon and polyester area. There was at least hope for improvement there. Not so with the production of acrylic fibers in Williamsburg. Closure of the factory loomed, and one energetic attempt after another had been made to turn it around. BASF insisted on halting expansion of the operations as long as the competitiveness of the acrylic spinning process was uncertain. New investment that had been planned was to be postponed until DB "turned a profit with the existing capacities and those now under construction."⁵⁰⁸ Such progress was unlikely to be quick, however. On the contrary, a pre-royalty loss of approximately \$8 million was expected in 1970, and no reprieve was on the horizon for 1971, either.⁵⁰⁹ If this slide were to continue until 1972, it could well result in a tight squeeze that would jeopardize a long-term grip on the American fiber business no matter what the long-term survival strategies were. At the annual board meeting in Curaçao in mid-1970, the directors of BASF Overzee N.V. showed "a definite concern" about the losses of their associate companies for the first time.⁵¹⁰ In the opinion of the holding's Dutch auditor, additional depreciation was essential in the balance sheet of Overzee because of the participation in DB. By late 1970, an accrued loss of DM 100 million was expected on BASF's half of DB alone, and many of Overzee's other holdings were likely to post losses. Moreover, none of those holdings had any hidden reserves to speak of. These misgivings had to be taken seriously, for the auditor's attestation was a requirement for meeting the regulations of the U.S. Securities and Exchange Commission (SEC), a hurdle to be jumped before a company could be listed on the New York Stock Exchange.

Surprisingly, DB's precarious situation did not lead to the first outright clash between the two partners. When Phrix's "extremely vulnerable position" became known in August 1970, Doan immediately traveled with Dow's top management to Timm's vacation spot in order to meet with Timm and Danz and seek a way out of the predicament.⁵¹¹ Doan and his team reproached BASF for "not having pursued a sound personnel policy at Phrix and for not having pulled the emergency brake energetically enough in time." Dow, they said, had entrusted BASF with the management of the Hamburg associate company and had become the victim of this mismanagement. Pressing their strong moral advantage, the Americans developed two scenarios for overcoming the crisis and called upon BASF to comment as quickly as possible. In one of them, Dow was prepared to sell DB at any price that "not only covered the price the two parent companies paid for their holding in Dow Badische but also ensured a capital gain that would compensate for the Phrix

⁵⁰⁸ Minutes of the managing board meeting of July 6, 1970; BASF RA.

⁵⁰⁹ Minutes of the managing board meeting of February 23, 1970; BASF RA.

⁵¹⁰ Minutes of the managing board meeting of July 6, 1970; BASF RA.

⁵¹¹ Minutes of the managing board meeting of August 24, 1970; BASF RA.

losses.” In the second scenario, Dow could imagine affiliating the profitable subsidiaries and the participations of Phrix AG with DB and continuing to operate them as legally dependent places of business so as to achieve “absolutely uniform management of the fiber works in the USA and the remaining fiber factories in the Federal Republic.” BASF did not want to rule out its consent to both solutions but reckoned it was “nearly inconceivable” to find a buyer who would be ready to pay the necessary price of DM 1 billion. To BASF, the modalities of payment were more important than the possibility of the sale itself. Given BASF’s own liquidity problems, Timm was “primarily interested in a cash payment of the price” and wanted to accept purchaser-issued bonds only “if they can be easily converted into money” – not to mention the purchaser’s shares as acquisition currency. He wished to agree to transfer to DB what was left of Phrix only if it was not detrimental to the BASF Group. What impressed the BASF managing board even more than these drastic proposals was “the speed and intensity with which a crisis is responded to at Dow right up to the highest level.”⁵¹² Implored by Magener “to put first priority on addressing the crisis from now on in each meeting of the managing board,” the board vowed to learn from the Americans at least in this regard.

Battle of Cultures: The Tug-of-War over Dow Badische

The “serious conflict” between the corporate cultures of BASF and Dow could not be confined to Phrix alone. Timm was firmly convinced that “the joint venture is dead.”⁵¹³ At best, he still thought joint liquidation of the fiber business possible, or “a kind of split that would see Dow Badische pass into Dow’s sole proprietorship and Phrix into BASF’s along with an appropriate compensation payment.” In the short term, it was important to BASF that Dow “in no way be relieved of its part of the responsibility for Phrix,” although this stance could not help but lead to a severe conflict of interest.⁵¹⁴ Whereas BASF was interested in straightening out the balance sheet quickly with a high write-off, Dow had problems making the Phrix losses usable for tax purposes and therefore tried to mask them as much as possible. Eventually, the foundation of BASF’s involvement in fibers began to rock because the company could no longer answer the “key question of whether [it] wants to stay in the fiber business and in ten years be among the world’s major fiber manufacturers alone or with Dow.”⁵¹⁵ Dow was even less certain about its own future on this market, so the crisis spread to the entire fiber area of the joint venture and threw all earlier decisions up in the air. For lack of a clear decision-making criterion, almost all solutions seemed feasible, provided they minimized the losses for both parties. On September 17,

⁵¹² Ibid. ⁵¹³ Minutes of the managing board meeting of September 30, 1970; BASF RA.

⁵¹⁴ Minutes of the managing board meeting of September 7, 1970; BASF RA. ⁵¹⁵ Ibid.

1970, BASF's supervisory board rejected all but one conceivable variation – BASF purchase of the Dow interest in DB – by obliging the managing board “to refrain from further engagement in the fiber area.”⁵¹⁶ The best way out, the sale to a third party, remained closed because no potential buyer turned up to solve all the problems like a *deus ex machina*. In October, the opponents collided hard in Midland “in negotiations that were very critical and dramatic at times.”⁵¹⁷ After initially offering to sell all its holdings (Phrix, DB, and Lurex) to BASF, Dow eventually sought to take over BASF's share in DB for \$80 million if BASF bought the Dow share in Phrix for \$30 million. Dow was also willing to pick up the BASF share in Phrix “at zero” if BASF paid DM 20 to 50 million compensation for the negative results expected of liquidation. BASF countered with the purely tactical offer of having Dow acquire BASF's stake in Phrix for one German mark. When Dow turned down the offer as expected, BASF proposed the opposite in order to increase its own “nuisance value.” BASF wanted to take over the ailing subsidiary for one mark if Dow paid BASF the book value of \$92 million for its share in DB along with a capitalized license for the know-how and patents that would pass to Dow. Dow did not accept this offer either, making it unambiguous that responsibility for Phrix continued to be a joint affair.

Ideas for separation pertaining to DB were debated as well, only to be cast aside right away. BASF would have been prepared to take over the chemicals production in Freeport and leave Williamsburg and Anderson to Dow. Although both complexes had about the same net value of tangible assets, Dow objected. After all, the fiber factories had a negative earning power, and Freeport was in the black. Dow nonetheless let it be known that it wanted to examine more realistic suggestions for separation but would rather improve DB's condition enough that the entire subsidiary could be sold by 1973 at the latest. The reluctant partners restated their intention to keep their eyes open for purchasers on both sides of the Atlantic.

Until they were found, BASF in particular had to make concessions. The start of licensing payments for fiber know-how was again put off for five years, the royalties for chemicals were suspended for three years, nearly all payments of research costs to BASF were discontinued, and the management was “simplified” at BASF's expense. The representatives from Ludwigshafen were unable to push through their proposal to take over the management in Freeport themselves and to cede the field to Dow at the other sites. With the greatest reluctance, they finally even had to accept the replacement of the dual-management principle and the transition to single management, which deprived BASF of power in the leadership of DB. Whereas the joint venture

⁵¹⁶ Danz to the members of the managing board, “betr. Festlegung der Verhandlungslinie mit Dow,” October 5, 1970, attachment 2 to 44/70; BASF RA, minutes of the managing board.

⁵¹⁷ Heintzeler, result of the discussions with Dow in Midland on October 15–16, 1970, October 21, 1970, attachment 1 to 46/70; BASF RA, minutes of the managing board.

had hitherto been led by two equally warranted executive presidents – J.T. Faubion from Dow and Tim H. Toepel from BASF – Faubion alone henceforth had the say, and Executive Vice President Toepel had to return to Ludwigshafen. The new top management was equally responsible to both shareholders, but the facts reflected a different actuality. Faubion answered directly to Earle B. Barnes, the head of Dow's U.S. activities. Twelve other engineers, chemists, and managers had to leave with Toepel, about half of BASF's contingent in the management of the joint venture. With four representatives, BASF still had the same number of seats as Dow on DB's management board, but in executive capacity BASF was present only in a joint steering committee consisting of Barnes and Erich Henkel, BASF's managing board member in charge of the newly created operational area of "Non-European Regions." To complete the humiliation, Dow generously offered BASF the opportunity to send an observer at BASF's own cost to the DB management, a person to whom all information was to be made available. Behind the riddance of the BASF crew lurked the tacit reproach that DB's poor performance was rooted in the irreconcilability of management concepts and even more in the subliminal tensions that had built on the clash between different ways of thinking and acting. After the Phrix debacle BASF preferred to respond defensively to such innuendoes and to temporarily accept the loss of active influence on the corporate management.

Unlike BASF's circumstances in the United States, where the only other option was to "attempt an orderly retreat," the company's situation in Germany was tactically stronger, albeit not an eminently pleasant one as far as Phrix went.⁵¹⁸ Dow had meanwhile returned to BASF's offer to acquire the second half of Phrix for the symbolic price of one German mark. The entire business was then to be merged with its subsidiary, Dow Deutschland Inc., which now had its own production plants in Rheimünster (1964) and Stade (1969). The advantage to Dow was obvious. A merger raised the possibility of absorbing the write-off of the Phrix participation taxwise,⁵¹⁹ a sum of \$13.5 million for 1970. But with a quarter of Dow's turnover already being generated in Europe, BASF was not willing to help its most dynamic competitor out of this pickle. The sale of Phrix as a going concern that had been operating since the negotiations in Midland likewise proved unrealistic. One after the other, ICI, Bayer, and Monsanto showed disinterest, making it seem inevitable that the main works in Neumünster would be dismantled and sold for scrap. Dow intensified the war of nerves with the pre-emptory announcement "that the Dow-Members of the Phrix-Aufsichtsrat [supervisory board] will at the meeting scheduled for March 26 resign after making proper statements as to their reasons and will renounce any future responsibility for

⁵¹⁸ Minutes of the managing board meeting of October 19, 1970; BASF RA.

⁵¹⁹ Minutes of the managing board meeting of November 30, 1970; BASF RA.

the company and turn the course of events over to BASF.”⁵²⁰ Having totally written off its participation in the Hamburg joint venture, Dow did not want to lose a single dollar more on Phrix. By threatening to pull out unilaterally and to recall its sureties for Phrix debts totaling DM 60 million, Dow raised the specter of scandal with the intention of forcing BASF to assume the risk itself in order to avoid any more damage to its image. Dow stubbornly refused to persist with the Neumünster works in the framework of a formal joint rescue company. It was believed in Ludwigshafen “that Dow, too, is aware that a Phrix bankruptcy is not a conceivable solution.”⁵²¹ Was Dow’s announcement a bluff, or was it meant seriously? The BASF managing board kept its nerves and let the ranting of the competitor from the midwest pass harmlessly. In March 1971, with negotiations “utterly stalled,” the former partners had nothing more to say to each other.⁵²² Once again, it became apparent how differently Americans and Germans handled the crisis. The local representative of Dow’s interests had power of attorney to respond quickly and flexibly to purchase offers of up to \$25 million from what were de facto the total assets of Phrix in liquidation, but BASF would not give similar authorization to its man on the Phrix managing board, Hans Albers. BASF in the Palatinate knew better than Dow in the midwest that these sorts of “rush jobs” were not possible in the German social system of production, for the employee representatives on the Phrix supervisory board had a say in the decision.⁵²³

The climate among the Phrix shareholders did not improve again until Gelsenberg AG was prepared to buy the Neumünster works for DM 62.5 million, a change that raised the chances for winding up the Phrix debacle in an orderly fashion. Although BASF had figured DM 80 million to be necessary, it acceded, enabling the Phrix supervisory board to clinch the sale in May 1971.⁵²⁴ Phrix also agreed to close the Siegburg works after a severance package had been worked out. A loss from bankruptcy was now no longer expected, especially since the prospects for selling Neumag did not seem hopeless, either. Under these new conditions, Dow no longer insisted on passing and enacting a resolution to liquidate Phrix. In early December Dow instead offered to sell its shares of Phrix’s share capital to BASF for DM 12 million. Evidently, Dow wished to settle the Phrix adventure before the end of 1971 in order to avoid “considerable tax disadvantages.” As signaled to Timm by Dow’s new president, Ben Branch, quick acceptance of the offer “would have a favorable effect on the future relations between BASF and Dow.”⁵²⁵

⁵²⁰ Minutes of the managing board meeting of March 29, 1971; BASF RA.

⁵²¹ Minutes of the managing board meeting of March 15, 1971; BASF RA.

⁵²² Minutes of the managing board meeting of March 29, 1971; BASF RA.

⁵²³ Minutes of the managing board meeting of February 22, 1971; BASF RA.

⁵²⁴ Minutes of the managing board meeting of May 17, 1971; BASF RA.

⁵²⁵ Minutes of the managing board meeting of December 4, 1971; BASF RA.

For other reasons, too, the Ludwigshafen managing board found it easy to oblige Dow. If BASF rejected the offer, the “Dowies” might sell their share to a third party, a move that would have been permitted under the Tripartite Agreement of 1968. That outcome would have certainly complicated protracted liquidation of Phrix on BASF’s terms. Besides, it became clear that the surplus from the liquidation would be higher “than $2 \times 12 = \text{DM } 24$ million” after the pending sale of Neumag to Büttner-Schilde-Haas (BSH), whose offer of DM 27.5 million fell only a little short of the desired proceeds. Timm therefore signaled his consent while still in the meeting, and the deal was transacted at midnight on December 31 – as provided for in a West German tax regulation that, in this case, enabled Dow to claim the sale in 1971 and still allowed BASF to shift the transfer of ownership into 1972 in order to offset it with the proceeds from the Neumag deal.

Defusing the conflict in Germany benefited the joint venture in the United States as well, although DB had not been managed as a joint enterprise with its European sister companies since November 1970. Little cooperation remained after BASF lost all active influence on the top management of DB. BASF was consoled, however, by the fact that DB’s earnings had developed wonderfully since then.⁵²⁶ Group turnover hit \$194 million in 1971, with a forecast of \$19.3 million in profits, not impending losses. Moreover, profit was predicted to climb as high as \$30 million for 1972. This outlook reduced the pressure to sell Lurex N.V. to Hoechst or GBAG, both of which had expressed interest in the Dutch joint venture of BASF and Dow. The revived DB itself wanted to expand Lurex into a base for the intended export of its products from Europe.

Branch had other ideas for DB’s future, though. In late March 1972, after “much soul searching,” the Dow managing board had resolved “to disengage from Dow Badische, not right away, but in due course.”⁵²⁷ Dow wanted to concentrate on its own portfolio and reinvest the proceeds in an area of chemistry more in line with the company’s business. True, fundamental differences of opinion and conflicts of interest with BASF had influenced the decision, but the emotional tensions in 1970 no longer played a major role at Dow. The decision stemmed also partly from Midland’s concern over DB’s bond rating, which reflected the company’s standing in the eyes of financial world.⁵²⁸ That standing was determined in great part by the debt-equity ratio. This ratio’s deterioration was due primarily to DB, a fact that played into the motive to leave. Branch regarded an introduction of DB shares on the stock exchange as an elegant way to solve all the problems and replace the now sour partnership with other ownership relations arising from the inevitable changes in each partners’ relative stake in the participation.

⁵²⁶ Minutes of the managing board meeting of October 5, 1971; BASF RA.

⁵²⁷ Henkel, file note “betr. Dow Badische,” April 5, 1972; BASF RA, file on DB.

⁵²⁸ von Knieriem, note “betr. Dow Badische Company,” April 24, 1972; BASF RA, file on DB.

Before things could go that far, however, DB had to turn a profit for two years after recouping all previous losses, and the fiber sector had to be rated positively again throughout the world. DB seemed well on the way to meeting the economic conditions for going public, so the integrated concept of DB finally seemed to prove itself. It provided for plans to advance from caprolactam as a raw material into the downstream areas of texturing, dyeing, finishing, and double knits (jerseys) and for developing extreme flexibility with special types of fibers. The new spinning factories in Anderson proved to be well conceived. They could be changed over to different types of fibers, and their capacity could be expanded with marginal investment. The principle of "use, sell, and buy" was anchored in all the steps of processing. DB had set up fully integrated fiber processing for about half of its own fiber production. It sold the rest to third parties, acquiring about 50 percent of the untreated fibers for subsequent treatment. The operations looked exactly as BASF had envisioned them in 1966, when it began expanding into the fiber business. It is no wonder that Ludwigshafen welcomed "the thought of continuing Dow Badische as a joint venture" and distinctly communicated this sentiment to Dow.⁵²⁹ For the time being, Timm did not seek a return to double management, but did want to arrange "an equal say for BASF on important issues of the company." He had to content himself, though, with restoration of the personnel committee, in which Barnes and Henkel set the remuneration of the top managers.⁵³⁰ Faubion assured BASF that he wished to stay neutral in its dispute with Dow and that he was loyally committed to both shareholders. After Barnes had taken his counterpart Henkel into his confidence, it could no longer be a matter of preserving the status quo in BASF's view, either. The company had to respond to Dow's notification about leaving the joint venture and had to define its own interests.

The situation as perceived by the outside world calmed down, and DB stayed on its successful course, but in the background the rivals were already taking their places for the decisive tug-of-war for control over the company. Dow continued pursuing the plan of "going public quite soon with 10 percent of the share capital of Dow Badische,"⁵³¹ with both partners selling the same number of shares. The operation seemed reasonable and supportable. A fixed market value on the stock exchange could facilitate a later separation, notably a withdrawal of one of the partners. Moreover, it would increase the flexibility of future decision making and would make it possible to tie members of DB more closely to the company by means of stock options. Dow was quite frank about its intention to quit the joint venture sooner or later because this kind of cooperation was deemed "disadvantageous on principle."

⁵²⁹ Minutes of the managing board meeting of April 26, 1971; BASF RA.

⁵³⁰ Minutes of the managing board meeting of November 22, 1971; BASF RA.

⁵³¹ Minutes of the managing board meeting of April 3, 1973; BASF RA.

By contrast, the BASF managing board thoroughly realized that “a decrease of BASF’s stake to less than 50 percent would decisively strengthen Dow’s influence and dangerously weaken BASF’s position.” On the one hand, the possibility existed that Dow might therefore be “systematically angling to push BASF out.” On the other hand, it was conceivable “that Dow will suggest that BASF purchase the Dow stake in Dow Badische if BASF does not join in going public.” From this assessment of the situation, it was only a short step to Henkel’s suggestion that the managing board use live ammunition:

With the thought of taking a strong negotiating stance from the start so as to counter Dow’s pressure appropriately and effectively, and in view of the fact that a less risky way to increase profit quickly is unlikely to exist for the BASF Group in the USA . . . in the foreseeable future, it is proposed that the acquisition of the Dow stake in Dow Badische be envisaged for BASF.⁵³²

Dow, too, saw that the only choice left for deliberation was that between further cooperation and a takeover of its stake by BASF.⁵³³ In principle, Midland continued “to cling to [the idea of] ultimately winding down its involvement in DB, although the problem is not urgent and has essentially become less and less pressing since 1970.” Dow’s pragmatic indecisiveness left the initiative largely with BASF, particularly since the American company substantiated its wait-and-see attitude and thereby made it predictable. Namely, the “Dow gentlemen” made it plain that DB “did not actually fit into the Dow concept,” which called for a 10 percent growth in earnings year after year. This “ten-percent religion” was not compatible with the risks of the fiber business and its “markedly cyclical economic patterns,” which were capable of perennially claiming more investment resources at DB than Dow could put up on its own. A comparison of net operating margins also reflected the difference in the significance that DB had for each of its two parent companies.⁵³⁴ BASF, having achieved 12 percent growth in 1972–3, could be thoroughly satisfied with DB’s profit margin of 13 percent, especially because it far outperformed BASF’s wholly American subsidiary, BASF Corporation. DB’s total rate of return on investment was average for the BASF Group. To Dow, whose profit margin reached 17 percent, DB at best held out hope for more remunerative fiber business later, and such optimism was waning.

⁵³² Henkel to the members of the managing board, “betr. Dow Badische –Vorbereitung der Vorhandlungen mit Dow über das Public-Gehen der Gesellschaft,” July 12, 1973, attachment 2 to 19/73, minutes of the managing board.

⁵³³ Henkel, “Besuch bei Dow in Midland on Montag, der 12.10.73,” November 2, 1973, attachment 8 to 27/73, BASF RA, minutes of the managing board.

⁵³⁴ Kohnle (Central Planning), “Dow Badische Group –künftige Entwicklung – Alternativen,” Ludwigshafen, October 9, 1973, attachment 4 to 26/73; BASF RA, minutes of the managing board.

The better that things went in the fiber business on the American market, the less Dow thought about simply ceding the field to BASF. In 1973 DB forged plans to expand the caprolactam capacity at a new site in order to reinforce its leadership in the production of perlon (nylon-6) in the United States. The plant was due to cost \$60 million and to produce 115,000 tons a year.⁵³⁵ Suitable property was available on the Tombigbee River in Calvert, Alabama. BASF watched this project with mixed feelings. On the one hand, the managing board in Ludwigshafen thought it right for someone to vie with BASF for the lead in technological processes now that two rivals – DuPont and Union Carbide – had failed in their attempts. The project offered excellent conditions for “auspiciously expanding the business possibilities for Dow Badische at low risk.” On the other hand, BASF could not help but find it all the more galling that it no longer had direct influence on DB’s management. The project involved a quarter of the global caprolactam market, a share that BASF and DB held jointly after the expansion, about half of the capacity being in the United States and half in Europe (Ludwigshafen and Antwerp).⁵³⁶ The strategic import of this footing was not to be underestimated. Among other things, it allowed for “later penetration of the American market with selected plastics.” More than anything, though, the planners were attracted by the vision of having unlimited control over an enterprise that represented what was by far “BASF’s strongest sales and earnings area in the USA.” BASF Wyandotte Corporation (BWC), which in the interim had subsumed all of BASF’s other U.S. activities, was hardly able to achieve “the profitability of the Dow Badische Group, even in the medium term.” Because Dow’s share of the net value of tangible assets were valued at approximately \$74 million, the managing board in Ludwigshafen was ready to invest a maximum of \$120 million for it, but it reserved the right to raise up to 49 percent of the purchase price by selling shares on the American stock exchange. All these game plans, though, were subject to a crucial proviso: The then-current management of DB had to remain intact for at least three to five years because BASF admittedly did not have enough suitable employees for this specific purpose. “BASF would not be in a position to take over the firm today on its own.”⁵³⁷ But without BASF, DB was threatened by the insidious loss of its innovative abilities because the outlays for research had fallen from 4 percent of the turnover to 1.2 percent after BASF had been pushed out.

⁵³⁵ Minutes of the managing board meeting of April 3, 1973; BASF RA.

⁵³⁶ Kohnle (Central Planning), “Faserrohstoffstudie,” Ludwigshafen, October 29, 1974, attachment 5 to 1/75; BASF RA, minutes of the managing board.

⁵³⁷ Kohnle (Central Planning), “Dow Badische Group – künftige Entwicklung – Alternativen,” Ludwigshafen, October 9, 1973, attachment 4 to 26/73; BASF RA, minutes of the managing board.

Against this backdrop BASF did not find it inopportune in late 1974 that Williamsburg and Anderson again scored high losses. In the first quarter of 1975 alone, cash losses of up to \$11 million loomed, requiring subsidies from both parent companies in order to maintain the equity capital at the level demanded by the creditors.⁵³⁸ This turn of events sharply contrasted with DB's planning, which had forecast a pretax profit of \$100 million for 1975.⁵³⁹ The caprolactam project at the new site on the Tombigbee River had already been postponed because of the new slump in the economy. Now it was Henkel's turn to cast doubt on Dow's managerial skills. He informed Barnes and the group's chief financial officer, Paul Oreffice, of "the unease of the BASF managing board." Ludwigshafen considered the entrepreneurial concept of the parent company "inadequate from DB's standpoint." Dow had repeatedly stated that it was no longer providing money and technology and that it was gradually distancing itself from the company.

BASF was thinking along the same lines, at least "as long as basic issues about the future of the company are not satisfactorily clarified." According to BASF, DB was in danger of "drying out," and its one-sided dependence on the fiber cycle meant that hazardous developments could not be ruled out in the future. Henkel then formulated his ideas of how DB could avoid this risk by manufacturing speciality plastics from nylon-6 and polyester, by processing products associated with slow-release fertilizers and animal-feed supplements, and by including acrylic ester dispersions. As heartening as this program seemed, it had one "design error": BASF was "understandably not willing to share the necessary projects with its most potent competitor in the area of plastics." In any case, both sides were of the same mind in their diagnosis and in their criticism of the "shortcomings of large-scale joint ventures."

The only unresolved question was how to untie the knot. Dow would probably have preferred a simultaneous withdrawal by both partners because the managing board in Midland recoiled at the thought of building up their rival, BASF. Purchase by the Shah of Iran – who was jokingly mentioned in this connection – was preposterous. By contrast, DB's attitude was unmistakable. Henkel believed Faubion had recommended to Dow that it take over BASF's stake. Barnes himself played coy. He called upon BASF to make an offer, pledging "fierce negotiations" and a completely uncertain outcome: "The next move is up to BASF."

At first, BASF went on the offensive in a different respect. Taking advantage of a courtesy call by Branch in October 1975, Timm asked the Dow

⁵³⁸ Henkel, "Dow Badische – Gespräch bei Dow Midland am 27.2.1975," March 5, 1975, attachment 1 to 8/75; BASF RA, minutes of the managing board.

⁵³⁹ Von Knieriem to Dr. Pistor, Director, "betr. Dow Badische Company, Board Meeting 24.3.1972," April 10, 1972; BASF RA, file on DB.

president to "send appropriate employees" in order to resume "active and constructive" collaboration on managing DB.⁵⁴⁰ Timm insisted on contractual rights and could imagine that BASF managers, such as the planning director or a director of fiber technology, would appreciably improve the quality of DB's management. Branch was "angry" at this unreasonable request but could no longer claim moral superiority over BASF, a pedestal on which Dowies had become accustomed to standing since the Phrix debacle. After all, Dow itself had meanwhile come under reproach for mismanagement. The list of faulty decisions and cases of negligence was long. DB's cumulative losses on account of forward integration came to \$25 million because processing plants had to be closed. Shortly before bankruptcy, Faubion had even taken over the shares of the minority shareholders for \$3.4 million. The imposed caprolactam project on the Tombigbee River had incurred sunk costs of \$9 million. The investment program had posted a cost overrun of more than 50 percent, and the planning had acquired absurd dimensions. Even after the crisis hit in early 1975, Williamsburg was still forecasting profits upwards of \$100 million over the next five years. Barnes and Orefice confirmed these reproaches but put the blame solely on Faubion. After censure of his "underhandedly optimistic reporting" and his "authoritarian style of leadership," those attending the "partnership meeting" on November 19 decided to dismiss Faubion by December 31 and, with BASF's consent, to entrust Edwin L. Stenzel with the management of DB. At this juncture Dow once again demonstrated its ability to respond quickly to a crisis. Henkel wanted to use the opportunity to argue for the "desired inclusion of German managers," but Barnes resisted, saying that "Mr. Faubion's departure actually ought to meet all [of BASF's] wishes." Dow still saw an integration of BASF managers as unwholesome "because of the unhappy experiences before 1970 (the watchdog function) and with regard to the cohesion and motivation of the management." Be that as it may, the two partners were back on the same level.

In 1976 the knot seemed to unravel after all. Fiber sales continued to plummet, pushing DB's overall result into the red. Dow now signaled willingness to sell. For the first time, BASF asked its supervisory board in December 1976 for fundamental consent to buy Dow's stake in DB. The hope of bringing the transaction to a close in January 1977 proved illusory, though. Dow insisted on a purchase price based on the proceeds defined by the equity book value, which came to \$58.5 million in DB's balance sheet, BASF was willing to pay only \$48.5 million. This amount was already substantially above the book

⁵⁴⁰ Reference to the meeting on October 21, 1975, in Ludwigshafen is in Henkel, Dow Badische – partnership meeting Dow – BASF in the Williamsburg Lodge on November 19, 1975, November 25, 1975, attachment 5 to 35/75; BASF RA, minutes of the managing board.

value of \$44 million recorded at BASF.⁵⁴¹ The “fiber risk” in particular precluded “complete acceptance of Dow’s wishes.”⁵⁴² In BASF’s opinion, the fact that the transaction would extricate Dow from the fiber business but would compel its partner to carry on with it “unequivocally had to lead to a reduction in Dow’s book value,” especially in view of the unmistakable losses that the auditors, Haskin & Sells, had listed in this area of work.

The transaction nearly foundered on the attempt to bridge the gap with audacious financing arrangements. Dow strictly wanted to avoid showing a write-down and would not compromise. Trying to put BASF in a more generous frame of mind, Dow pointed out the value of its “decisive start-up assistance for the America business” of BASF. Entering the fiber business had been “a joint mistake,” but the plunge into a “\$30 million bath” at Phrix was solely BASF’s own fault. DB found itself “in quite good shape” again after the crisis. Only the Freeport site, which had been calculated with residual values based on replacement costs, was worth more than the requested purchase price. Meanwhile, Dow was no longer in a hurry to quit DB; the company’s health had improved since 1976.

But Dow did want to end the suspense at last so as to avoid damaging the long-term relations with BASF. To keep the exact purchase price from leaking to the outside world, Barnes suggested settling on a “hanging deal” that would have to run for several years. BASF, which had already written off the value of its DB stake in 1976, at last accepted a purchase price of \$49.5 million and agreed to come up with the rest through an unequal exchange of property tagged with a definite value. Accordingly, just under 123 acres of a neighboring supplementary plot owned by Dow in Freeport was exchanged for slightly more than 988 acres (about 1½ square miles) of DB’s land on the Tombigbee River, a site that had once been reserved for the expansion of the caprolactam plant. BASF thus paid what it saw as significantly more than what was stated in its own valuation report, a price warranted only by “the strategic importance of this step.”⁵⁴³ The transaction was financed by the issue of a BASF-guaranteed private placement of more than \$50 million by Overzee. In April 1978, 20 years after the Acrylic Plant Agreement with which the joint venture had been created and 8 years after that project’s ruin, BASF thus had for the first time the wherewithal for serious involvement on the American market.

⁵⁴¹ Ressort U, “Dow Badische – Erwerb des 50%igen Dow-Anteils durch BASF,” March 28, 1978; BASF RA, file on DB.

⁵⁴² Henkel, “Dow Badische – Gespräch mit Dr. E. B. Barnes, Corporate Executive Vice President of Dow Chemical Company in Ludwigshafen am 2. und 3 März 1978,” March 9, 1978; BASF RA, file on DB.

⁵⁴³ Ressort U, “Dow Badische – Erwerb des 50%igen Dow-Anteils durch BASF,” March 28, 1978; BASF RA, file on DB.

Exporting a Model: Consolidation through the *Verbund*

The costs of the partner buyout were unjustifiable without the prospect of synergetic effects that would increase the critical mass of BASF's disparate and not always felicitous activities on the American market. The losses in the fiber sector, which was one of the hopes for forward integration toward end-consumer markets, could not be offset for long, if at all, by the earnings from Freeport's chemical production. Polyester fibers and some acrylic fiber products had already suffered cash losses. Many of the plants operated by DB, which had been renamed the Badische Corporation, were no longer state-of-the-art in the fiber area. The decision makers in Williamsburg, Anderson, and Ludwigshafen had long since bitterly recognized that they could not "decisively affect the adverse development through our own research results."⁵⁴⁴ Having only 2.5 percent of the U.S. market for synthetic fibers, BASF also lay far below the crucial threshold beyond which it could achieve success on its own. Perpetuating the production of polyester fibers in particular would have been "synonymous with chronic bloodletting for the company," as the managing board straightforwardly acknowledged in its report to the supervisory board.⁵⁴⁵ After already parting with two processing plants, letting go of Lurex's business in the United States, switching the polyester spinning plants over to nylon-6, and shutting down the area of polyester texturing, DB left the polyester fiber business altogether. Furthermore, all preparations were made to shed the fiber and yarn area quickly if necessary and sell it to a solvent fiber manufacturer. An immediate exit from the fiber business, a desirable move in principle, was out of the question not only because it would have adversely affected earnings at first but also because it was closely linked to caprolactam and polycaprolactam. In this regard, the system of broadly interlocking production programs and plant complexes – the verbund system – proved to have disadvantages as well, for it restricted the flexibility of entrepreneurial decision making. A buyer would have had to accept ties to the Badische Corporation for a long time with orders of caprolactam.

The Badische Corporation had to be content instead with building up and expanding other areas of work first in order to reduce the role of fibers and yarns in the business as a whole. The circumstances for this effort were now that much more favorable, however. BASF regained full discretion over the capital committed in the United States, controlled its own cash flow, had considerable land reserves, and won two fully operable, highly modern caprolactam plants, not to mention the shares of the U.S. market that went

⁵⁴⁴ AZS, "Expertise II – Dow Badische Comp. – Erwerb der restlichen Dow Anteile durch BASF," September 6, 1976; BASF RA, file on DB.

⁵⁴⁵ Ressort U, "Dow Badische – Erwerb des 50%igen Dow-Anteils durch BASF," March 28, 1978; BASF RA, file on DB.

with them. These changes enabled the company to coordinate the caprolactam sales of the BASF Group throughout the world and, with free access to nylon-6, to develop a unified, coherent concept for augmenting the Badische Corporation's potential profitability with speciality plastics on the American market. Opportunities for integration into BASF's network of operations and product lines opened up in the manufacture of oxoalcohols, softeners, and acrylic acid, making it seem possible to broaden the diversification of chemical production in North America.

Up to that time, BASF's operations in the United States consisted mainly of the BWC, which it had acquired in 1969, with its production sites in Wyandotte, Michigan, and Geismar, Louisiana. Although Wyandotte was only a medium-sized chemical company, BASF's purchase of it required the hitherto largest investment that any German enterprise in the United States had had to make. The financial strain was all the greater because neither the SEC registration of BASF stock nor permission to list the securities on the New York Stock Exchange came through quickly in order to facilitate the acquisition of Wyandotte shares in exchange for BASF shares.⁵⁴⁶ It took a long time to determine whether the expense had really been worth it. With a group turnover of a billion West German marks, a workforce of 8,000 persons, and 0.5 percent of the U.S. market, BASF had now greatly raised its profile, but it still suffered from the heterogeneity of its production structure and the inefficiencies of operating separate sites. The weaknesses of BASF, Inc., which had been created as a marketing company, were even more pronounced and were plainly rooted in the production sector. The company itself produced only 40 of the 1,000 products that BASF Corporation offered on the American market.⁵⁴⁷

This imbalance was to change at least somewhat, for the new flagship with its broad program of basic and intermediate products cleared a path for BASF to follow up with chemistry tailored to a Ludwigshafen-type configuration of interlocking production operations. The purchase decision rested in part on this paramount condition.⁵⁴⁸ Wyandotte was an important actor in the United States, especially in polyurethane primary products. This fact, too, caught BASF's attention. BASF already had "the world's widest range of plastics and foam by far."⁵⁴⁹ The obvious step was therefore to add the large and dynamic area of polyurethane foam to the styrene business, particularly since the company had little presence on the market for flexible foam.

⁵⁴⁶ Minutes of the managing board meeting of August 25, 1969; BASF RA.

⁵⁴⁷ "Die BASF in Nordamerika," *BASF Information*, September 1970, p. 8.

⁵⁴⁸ Minutes of the managing board meeting of August 25, 1969; BASF RA.

⁵⁴⁹ Manfred M. Minsinger, Speciality Plastics Division, to the members of the managing board, "betr. Weitere Vertiefung der mit MKW, Paris, bestehenden Zusammenarbeit zwischen der Gruppe Ugine Kuhlmann (UK) und der BASF-Gruppe," attachment 7 to 55/70; BASF RA, minutes of the managing board.

“Bayer’s unusually strong position on the market” – Ludwigshafen’s way of paraphrasing the co-affiliate’s monopoly – was thereby neither respected as it customarily had been until the mid-1960s, nor felt to be troublesome for BASF’s own advance. On the contrary, many processors seemed ready to look for a second supplier so as to underscore their independence. The BASF Group wanted to secure 30 percent of Europe’s total consumption, which by 1980 was estimated to be DM 2.5 billion.

This goal did not seem presumptuous, for “practically all the raw materials required for these products... existed in our own company as key commodities.” The laws of BASF’s calculated creation and use of synergies from different lines of production and technical infrastructures would then give the company a cost advantage.⁵⁵⁰ Even before buying Wyandotte, BASF had therefore developed this area of activity by acquiring the Reuter Group together with its holding company, Elastomer AG in Chur. BASF sought to position itself on a market that also took a good deal of know-how in applied engineering. The sale of flexible foams for the upholstery industry and rigid foams as construction elements for furniture, housing, and automotive manufacturing called for establishing “a very close tie to customers by tuning in [our] receptors to each one’s needs, by also selling the design and the necessary machines.”⁵⁵¹ In principle, this view was consistent with Ludwigshafen’s cultivated culture of customized quality production, but it demanded the proper expertise. The value of the Reuter Group thus lay not only in its machines and plants, “but also in precisely this knowledge and highly qualified personnel.” Even more important in this context was the managing board’s overt endorsement of polyurethane as a future area of work, “both in terms of primary products and processing.”⁵⁵²

Another fact figured prominently as well: the acquisition of Elastomer AG and its subsidiary, North American Urethans (NAU) in Troy, Michigan, further complementing BASF’s potential in this area. In the early 1970s NAU was included in the merger of Wyandotte and BASF, Inc., as was BASF Systems, the computer tape producer, which tough competition had driven to seek shelter in the BASF fold.⁵⁵³ After the merger, the new offices that BASF, Inc. had built in Parsippany, New Jersey, in 1970 served as BWC’s headquarters. BWC tried to capitalize on the differences between American and German corporate culture by teaming up American generalists with German specialists so as to draw on their respective strengths and compensate for their weaknesses. The symbiosis of German technology and American marketing became a trademark of BWC’s business policy, though success was

⁵⁵⁰ Pistor, dossier “Zukünftige Aktivität der BASF auf dem Polyurethangebiet,” February 27, 1969, File 5 to 8/69; BASF RA, minutes of the managing board.

⁵⁵¹ Johannes G. Grohmann [department head], dossier “betr. Erwerb der Reuter-Gruppe,” May 29, 1969, attachment 4 to 15/69; BASF RA, minutes of the managing board.

⁵⁵² Minutes of the managing board meeting of June 2, 1971; BASF RA. ⁵⁵³ See section 9.

not immediate. Strategically, the company was confronted by the choice between diversification into new areas of work or concentration on its existing strengths. In the end, it opted for a much narrower concept providing for only one area, the crop protection products Basagran and Basalin.⁵⁵⁴

Nonetheless, this opening gave BWC entry to the lucrative field of agro-chemicals, which has been pursued in the Geismar works ever since. Other than that venture, Parsippany wanted the new plants to concentrate on familiar areas of work in order to avoid “a cumulation of transport losses by numerous new plants” and “a temporary slide into the red.” As at the Geismar site, 30 percent of the company’s entire investment – the largest share – was to be allocated to expansion of the capacity for propylene oxide, an organic basic chemical essential to the manufacture of polyurethane primary products. However, BWC had only the know-how and the technology for the chlorhydrin process. The oxirane process, which was superior, had not yet passed its crucial trials as a large-scale technology at Shell. Its further testing laid the cornerstone for continued cooperation with Shell and in the 1990s led to its most visible manifestation: the creation of a joint venture, Ellba, in Moerdijk (the Netherlands). The new tack was convincing because it stressed the strengths of the BWC plants, which lay partly in the subsequent chemical uses of acetylene, though it did entail great risks as well. In any case it was plain that BWC, despite its turnover of \$590 million (1975), placed even lower than DB in the rankings of profitable companies within the BASF Group in the 1970s. But the stage that was set, especially in Geismar, already suggested the outlines of a new integrated plant complex.

Together with its new “full-fledged subsidiary,” Badische Corp. (BC), BASF posted a total turnover of \$1.59 billion in North America in 1979, one billion dollars of it earned by BWC, whose crop protection products, organic chemicals, and Styropor were highly successful. The great breakthrough in polyurethane chemistry was still to come because the major investments of the 1970s were only just beginning to bear fruit. BC first had to de-escalate the risk it was running in the fiber industry, one of its cardinal problems for years, before trying to expand caprolactam capacity and to perfect the integrated production system, the verbund. However, the turn-around managers in Williamsburg and Anderson found the latter two aims too closely connected for comfort. As easy as it was to shut down the PAN fiber production and abandon processing, it was difficult to do the same with synthetic fiber production. Withdrawal from the latter activity would have adversely affected the preceding operational stages and would have negated all the effort to optimize the interlocking lines of production and technical infrastructures. BC therefore concentrated the fiber business on the Anderson site and even seized the bull by the horns. By mid-1985, the company had greatly

⁵⁵⁴ Kohnle, Klotmann, Strategic Planning, BWC – the strategic concept [end of 1973]; BASF RA, minutes of the managing board.

expanded Anderson's capacity so that economies of scale could help move it into the black.

Ultimately, it took a notable success to do the trick. Purchasing American Enka, N.C. – with sites in Enka, North Carolina; Clemson, South Carolina; and Lowland, Tennessee – BC acquired in 1985 the critical mass necessary to keep its fiber business alive and, in keeping with BASF's philosophy, staked everything on synergy effects from its growing caprolactam production. At the Enka site, where perlon carpets were manufactured also, there were additional innovations over the years. The fibers division focused on the modernization and expansion of nylon fiber production in the Anderson and Clemson factories and withdrew from the business in rayon fibers, textured yarns, and polyester fibers. To shift activities closer to the sales markets and production sites in the South, headquarters was moved from the traditional location in Williamsburg to Charlotte, N.C. The fibers division in Dalton, Georgia, simultaneously received a new carpet center to capitalize on its technical service. With these changes, a second special feature of Ludwigshafen – the first being the fully integrated plant network – demonstrated its power to leave a mark. However, radical structural measures, massive write-offs, extreme rationalization, the concentration of capacity on four sites, and deep personnel cutbacks were unable to alter the overall trend that began in the 1990s: the shift of fiber production to Asia. BASF has acknowledged that reality since 1996, when it founded BASF Hua Yuan Nylon Co. Ltd. in Shanghai, an enterprise in which it has come to hold a 90 percent stake.

As the American fiber business shifted more and more to the periphery, BASF's pivotal activity emerged with ever greater clarity. It lay in the production of plastics and chemicals chiefly at two plant complexes, Geismar and Freeport. In 1985, this process of concentration was also expressed organizationally when acquisition of the Inmont Group⁵⁵⁵ led to the merger of BASF Inmont, BWC, BC, BASF Systems Corp., Glasurit America Inc., and Limbacher Paint & Color Works, creating BASF Corporation seated in Parsippany. With a turnover of \$7.8 billion, it achieved approximately one-quarter of the turnover in Europe and employed about 20,000 people.⁵⁵⁶ After the corporation expanded its main line of business (the production of chemicals), this relation rose to one-third by the end of the twentieth century, with profits amounting to about one-fourth the European sum; investment outlays, more than one-half.⁵⁵⁷ In the second half of the 1980s alone, Geismar saw the construction of 14 chemical production plants. As at other sites, they have proven to be long-term cash cows for BASF. The BASF corporation is currently starting up one large chemical plant each quarter, documenting the

⁵⁵⁵ See section 9. ⁵⁵⁶ BASF annual report for 1985, p. 36.

⁵⁵⁷ BASF annual report for 1985, pp. 12–13.

will to stand its ground on the market created by the North American Free Trade Agreement, NAFTA.

8. CRISIS AND CONSOLIDATION

BASF: Badische Annulment and Suspension Factory

The new course on which the company embarked in 1963 at Magener's proposal was successful at first. On April 6, 1965, BASF's 100th anniversary, the company looked back on the highest total turnover in its history. It had climbed 18 percent to DM 3,755,000,000.⁵⁵⁸ The pre-tax profit of BASF AG, DM 501.8 million, represented an even higher increase – 20.9 percent over the previous year's figures. Net earnings (DM 240.1 million) had risen about 50 percent more rapidly than turnover had, seeming to indicate that BASF was moving toward the more lucrative markets that Magener had in his sights. This assumption was supported by the fact that the turnover of BASF AG, the group's parent company, went up by only 14.4 percent. In other words, growth was being spurred most by recent commitments outside Ludwigshafen. A number of them had come about in 1964: the magnetic tape factory Suma S.A. in Gien, France; BASF Antwerpen N.V.; Ammoniak Unie N.V. in Rotterdam (50 percent Mekog-Albatros); Compagnie Chimique de la Méditerranée (CO-CHIME) in Berre near Marseille (50 percent Shell); BASF Mexicana S.A.; and Computron in Waltham, Massachusetts, near Boston. The new motto, "*Wachstum ist machbar und planbar der Ertrag*," asserted the feasibility of achieving growth and planning profits. It was reflected in an investment of DM 490.9 million, an amount 15 percent greater than in the year before. Investment schedules called for a further DM 700 million in both 1965 and 1966.⁵⁵⁹ In short, BASF was serious in its intention to become number one in the industry.

To finance the acquisitions, BASF increased its share capital in 1964 and 1965, drawing on authorized capital to raise it from DM 800 to 850 million and adding DM 250 million more by issuing new shares (at a price of 100 percent). The difference between the amount of investment and depreciations was financed largely from the DM 240 million in proceeds from a 5½ percent convertible bond and a loan of 60 million Swiss francs. Another DM 200 million were borrowed as well. The ratio of BASF's own capital to its borrowed capital thereupon shrank from 52.6 percent to 48.1 percent as compared to an average of just under 77 percent during the reconstruction years from 1953 through 1963.⁵⁶⁰ The much higher figure had stemmed only

⁵⁵⁸ BASF annual report for 1964, pp. 9–12.

⁵⁵⁹ Minutes of the managing board meeting of February 8, 1965; BASF RA.

⁵⁶⁰ BASF, Volkswirtschaftliche Abteilung (Department of Political Economy), comparison of short-term development at BASF, Bayer, and Hoechst, May 1964; BASF UA, B4 981.

partly from the special conditions of the reconstruction period; it had also been due to a comparatively conservative financial policy. The equity ratios of Bayer (63.7 percent) and Hoechst (69.9 percent) in those years had been significantly lower than those at BASF. Internally, Magener had long reckoned with a 60:40 target ratio of borrowed capital to equity for BASF – still a conservative relation in comparison to that found at the other successor companies of the former trust.⁵⁶¹

But this strong-man act soon met resistance in terms of finances and other resources. The strain on the workforce drastically intensified, and “the conditions on the premises in Ludwigshafen gradually set limits on further expansion.”⁵⁶² More important, the finance department could not fund the amount of investment that had been planned. In the summer of 1964 Magener realized that the possibilities for short-term borrowing had been exhausted and urged the engineering department to moderate its ambitious plans for expansion.⁵⁶³ Although Timm resolutely rejected any cutbacks in “projects within an integrated production system,” he finally declared himself willing to reduce the investment to DM 700 million for 1965 and DM 650 million for 1966. To be sure, even these levels still confronted the engineering department with overwhelming problems, so the debate in the managing board was largely academic.

Factory gossip that BASF had allegedly slid into financial trouble bid caution, too.⁵⁶⁴ The unaccustomed sense of new directions, the continual announcements of new acquisitions, and the immense and unmistakable efforts to turn the Ludwigshafen factory into a new kind of integrated production complex transformed the chronically somewhat sleepy site into a frantic anthill. The managing board’s every project rejection or even retrenchment, no matter how economically reasonable, was immediately interpreted by middle management as the onset of crisis, sometimes making it necessary to anticipate these hurdles to the acceptance of top management’s new course. When poor forecasts for the fiber business would have suggested a temporary suspension of plans to build a caprolactam plant for Basant, the managing board decided instead “to adopt no negative resolutions at this time and to counteract the scaremongering within the enterprise.”⁵⁶⁵

Advance warnings against overstretching also came from the inner circle of BASF’s management itself. Magener, of all people, advised at the end of the year to beware the gradual darkening of West Germany’s industrial economy, which was skidding toward its first postwar recession.⁵⁶⁶ Abs gave

⁵⁶¹ Minutes of the managing board meeting of March 16, 1964; BASF RA.

⁵⁶² Minutes of the managing board meeting of February 15, 1964; BASF RA.

⁵⁶³ Minutes of the managing board meeting of August 3, 1964; BASF RA.

⁵⁶⁴ Minutes of the managing board meeting of February 15, 1965; BASF RA.

⁵⁶⁵ Minutes of the managing board meeting of November 8, 1965; BASF RA.

⁵⁶⁶ Minutes of the managing board meeting of December 13, 1965; BASF RA.

early prime testimony about the general erosion of BASF's earnings position and about the tight finances, all of which could not help but have an impact on BASF as an enterprise having almost every facet of its sector. Far from recommending procyclical investment behavior, Magener did not want to conclude "that [BASF's] own expansion had to slow." Instead, he argued for even more caution when selecting investments and for avoidance of any large projects for the time being because the company had reached the limits of what its finances and, above all, its personnel could take.

The cyclical dip was far less a reason for concern to BASF than was the restrictive practice of the Bundesbank, which always opted to stabilize the currency if it had to choose between cyclical and monetary policies. With a tight money policy looming, Magener was avid about lining up bank credit within Germany and abroad to ensure BASF's liquidity. In March 1966 alone, he concluded four loan contracts totaling approximately DM 75 million.⁵⁶⁷ Nevertheless, discount rate hikes and other monetary measures curtailing loan availability checked the financial discretion of a briskly expanding company like BASF, particularly since Magener had no doubt that the Bundesbank was determined to go on this way "without regard for the effects this policy . . . can have on individual companies."⁵⁶⁸ This conviction called for staying highly liquid, and by mid-1966 BASF's liquidity ranged from DM 320 to 330 million. It also meant doing everything to avoid exceeding the amount of investment slated for 1966 (a sum that had meanwhile been scaled back to DM 590 million) and to steadily slim inventories as planned. Liquidity assistance for ailing subsidiaries – such as Auguste Victoria, which was expected to lose DM 28 million at the height of the coal crisis – was now especially disconcerting.

The conservative financial policy seemed to pay off. Despite the application of the brakes, pretax profit continued to rise, increasing by 28 percent in the first half of 1966, whereas it dropped by 12.2 percent at Bayer. The 19.6 percent growth in the turnover of the BASF Group was more than double the figures reported by Bayer and Hoechst.⁵⁶⁹ In 1967 Magener wanted to do without any outside financing of investments. They were brought down to a level that matched the expected cash flow exactly. Plans for plant expansion costing DM 525 to 600 million were to be envisioned only if the earning power of BASF AG improved and if the capital market eased. Exceptions to the policy of caution – no additional debt or borrowing – were

⁵⁶⁷ Minutes of the managing board meeting of March 14, 1966; BASF RA; Magener to the members of the managing board, "betr. Kreditangebot Chase Manhattan New York/Frankfurt" March 17, 1966, attachment 1 to 9/66; BASF RA, minutes of the managing board.

⁵⁶⁸ Minutes of the managing board meeting of May 31, 1964; BASF RA.

⁵⁶⁹ BASF, Betriebswirtschaftliches Büro (Business Management Office), Vergleich BASF/Bayer/Hoechst, January-June 1966, attachment 2 to 27/66; BASF RA, minutes of the managing board.

permitted only for the promising members of the Group. BASF Overzee was put in a position “to carry out the necessary third-party financing for Dow Badische, Badische Products, and Computron.”⁵⁷⁰ BASF did not forgo opportunities to pursue what were held to be lucrative projects and at least started procedures to examine them, as in the case of a joint venture with the multinational oil company Phillips involving “an array of petrochemical plants” in Puerto Rico.⁵⁷¹ The big haul that began in 1965 on the German lacquer market proceeded apace, although initial setbacks after the takeover of Glasurit AG showed that the hope for short-term rises in profits from such acquisitions could be deceptive.⁵⁷² Other expansive thrusts such as the long-decided entry into the pharmaceutical and fiber business were stymied less by financial straits than by the dearth of suitable opportunities. When the credit market was at its weakest, the Phrix takeover was in the offing without financial considerations having any negative affect. External financing was not necessary to the extent that “acquisition currency” for such takeovers was available from authorized capital. However, these financing methods put BASF’s profit plan under mounting pressure in the medium term. With a 20 percent dividend, which facilitated financing by means of capital increases, pretax profits had to exceed DM 600 million to satisfy the shareholders and simultaneously allow the company to build adequate reserves, meaning at least DM 100 million from current profits.⁵⁷³

Most options for accomplishing this objective were medium or long term in nature. Besides an organizational reform emphasizing decentralized, self-responsible, and profit-oriented entrepreneurial decisions, the priority topic on the agenda was perseverance in the adopted combination of profit planning and optimization of the verbund system. The only real leverage on the outcome lay on the cost side. There was no way around BASF’s largest and stylistically influential department, engineering. Since the 1950s its 14,645 employees had always represented more than 31 percent of the total workforce at BASF AG. More than 52 percent of the engineering costs went for personnel, so quickly trimming this item from DM 353 to 300 million as now desired actually amounted to a freeze on hiring wage earners and standard salaried employees in that department. Only the “hiring of top-flight personnel was still desired.”⁵⁷⁴ The primacy of the engineering mindset did not succumb overnight at BASF, but it is in this regard that one can grasp the consequences of the paradigm shift from technological visions to established practices of business economics as the basis for managing an enterprise, a change associated with the transition to the principle of profit planning.

⁵⁷⁰ Minutes of the managing board meeting of July 4, 1966; BASF RA.

⁵⁷¹ Minutes of the managing board meeting of July 25, 1966; BASF RA.

⁵⁷² For more information, see section 9.

⁵⁷³ Minutes of the managing board meeting of December 5, 1966; BASF RA.

⁵⁷⁴ Minutes of the managing board meeting of April 24, 1967; BASF RA.

Neither the break with engineering's traditional role in the company nor Magener's regular and frequent calls to draw down inventories could forestall the slump in turnover and profit in 1967. Not even the lowered profit target of DM 549 million was met, and the desired net reserve fund of DM 44.2 remained a fiction.

Although the principle of profit planning had been introduced at BASF in 1963, the notions surrounding it and the specific coordinates of the new course were too indistinct to provide much guidance. Methodological shortcomings were evident, too. The focus of planning remained on turnover, whereas the profit targets were only internal declarations that could not necessarily be operationalized. Since that time, however, recession had exacerbated BASF's problems, particularly in the areas of fertilizers, plastics, and fiber primary products. Areas of BASF AG representing about half of its turnover were earning a 22.6 percent return on sales, well below average (26.3 percent).⁵⁷⁵ Despite the fact that BASF had invested about DM 2 billion in new plants since 1963, its earning power had not gained significantly. Magener's ambitious profit target – a dividend of 20 percent and reserves of up to half of the amount paid out – plainly could not be achieved by BASF "in its present condition and with its current range of products."⁵⁷⁶

The head of finance took the poor track record of his profit planning and appended a long list of demands whose implementation was supposed to guarantee success at last: cease capital increases from shareholder resources, allocate no further money to run-down areas of the company, save costs in the oversized service units (engineering and Aweta), grant no sales discounts, focus research on the problem with earnings, inaugurate organizational reform, and purchase highly profitable companies by exchanging shares. Against this background one question became ever more compelling: Where was further expansion leading if it was unjustified because of falling profits and overcapacity in areas generating around 50 percent of BASF's turnover? Admittedly, directions for expansion and forward integration were emerging in certain regions (the United States) and products (tape recorders, fibers, and lacquers), but there was still a lack of definite strategic concepts for liberating specific steps from their opportunistic and defensive character. Possible new areas of business were discussed – pharmaceuticals, feedstuffs, biological systems of crop protection, and molecular biology – and it was "unanimously determined that BASF activity in the pharmaceutical area would be desirable."⁵⁷⁷ Action on this view, however, was to take place over many years, if at all.⁵⁷⁸

The business economy stabilized in late 1967 and resumed its upward trend with the help of Keynesian public-spending programs. In July 1968 BASF posted a new record in turnover. At the same time, though, new

⁵⁷⁵ Minutes of the managing board meeting of July 17, 1967; BASF RA.

⁵⁷⁶ Minutes of the managing board meeting of October 2–3, 1967; BASF RA. ⁵⁷⁷ Ibid.

⁵⁷⁸ See section 9.

acquisitions in Germany (Phrix) and abroad (DB, Computron, and Basant) announced losses that challenged the very concept of profit planning.⁵⁷⁹ Internal growth was setting in again, and the external growth of the BASF Group continued without interruption, just as it had during the recession. Aside from Nordmark-Werke (pharmaceuticals), Herbol (lacquer), and Phrix (fibers), the takeover of Wintershall AG was the main drain on BASF's financial resources, which were pushed to the limit. When the control agreement with the Wintershall Group went into effect on January 1, 1969, BASF held more than 75 percent of the share capital of DM 176 million. The Kassel Corporation complemented BASF's corresponding production program by manufacturing compound and potash fertilizer, which accounted for about one-third of the new acquisition's sales of DM 1.7 billion. Wintershall's main line of business – obtaining and processing petroleum products – facilitated the backward integration into raw materials, which, like forward integration into processing, had been one of BASF's strategic options since 1967. BASF also moved into the polyurethane area by acquiring Wyandotte and Elastomer AG in 1969. In the "Report on the State of the BASF Group in Mid-1969," the finance department listed numerous large and small acquisition transactions, ending with the sentence: "Overall, the impression is one of almost alarming growth of the Group."⁵⁸⁰

Although the pretax profit of BASF AG was rated "superb" (the rise of 27.5 percent lay just shy of the target), new domestic acquisitions (Herbol) and nearly all the foreign companies, on which high hopes had been pinned, poured a good deal of water into the wine. Their results on the whole were very "disappointing" – and had been for many years. It seemed imperative to define "a threshold of capital maintenance that must not be exceeded before the reflux of capital from previous investments begins." With other planned financial investments totaling DM 400 million, the finance department emphasized that the company did not have the strength to undertake any more large acquisitions. Given the described situation and the incipient slowing of business activity in both Germany and the other industrialized nations, Magener all but begged the managing board "to proceed very selectively with new acquisitions and to avoid engaging in any new major projects until further notice." He now invoked the primacy of financial planning, "because enormous financial strains are surfacing on the horizon (Basant, a nuclear power plant, the expansion of Wintershall, interlocking purchases, expansion in pharmaceuticals, the caprolactam factory in Argentina, large investments in the USA, etc.)." Freiensehner backed him up, explaining that the pace of acquisitions had to slacken if only because BASF simply did not

⁵⁷⁹ Heinrich J. Jonas [deputy director], BASF-Gruppe per September 1968, attachment 1 to 33/68; BASF RA, minutes of the managing board.

⁵⁸⁰ Attachment 1 to 20/69; BASF RA, minutes of the managing board.

have enough suitable managers to go around.⁵⁸¹ The managing board therefore quietly readopted measures to retard the enterprise's development and keep it within a tenable financial framework. Yet in October 1969 Timm officially announced to the supervisory board the commencement of a "consolidation phase" from which he specifically excepted acquisitions in the pharmaceutical division.⁵⁸²

In late 1969 and early 1970, the company's financial circumstances deteriorated. The downturn was not altogether surprising but unexpectedly rapid. In order to defend the stability of the German mark, the Bundesbank refused to give any further credit, making bank liquidity so critical that a tightening of credit seemed likely in individual cases. In conversation "with a number of gentlemen from the banking world" at the celebration of Kurt Hansen's 60th birthday in Leverkusen, Timm gathered "that the subject of BASF's future financing needs the keenest attention."⁵⁸³ Subsequently called to account by the managing board, Magener had to acknowledge that "the external sources of finance are virtually cut off at the moment." Because some of the loans in BASF's portfolio were tied to the Bundesbank's discount rate, every new restriction directly affected the company's financial status quo.

Just ducking the problem in this predicament was as useless as taking on new debt. In 1969 BASF hit its borrowing limit when it added DM 800 million to its loan capital. The "planned" 40:60 ratio of equity to debt had slipped to 30:70. Given these facts, capital increases, too, seemed inopportune for the time being. The only way out of the liquidity impasse was, first, to slash inventories in order to free up capital and, second, to shave the Group's planned investments of DM 1.55 billion in order to compensate for the DM 400 million gap in the 1970 budget.⁵⁸⁴ BASF AG alone had to diminish its share of the investments from DM 800 to 600 million, sending BASF down a long road of awkward, embarrassing annulments, suspensions, and cancellations of existing contracts, a period that earned BASF the sobriquet Badische Annulier- und Storno-Fabrik (Badische Annulment and Suspension Factory).

The full force of all this economizing first struck the outside companies operating on the factory grounds. Within a few weeks, approximately 1,500 artisans and 200 engineers had to leave. That was only the prelude. The financial troubles were aggravated by losses of turnover. Business activity flagged, squeezing the company's budget on the earnings side, too, and threatening a vicious circle in which the decline in profits raised the remote possibility of a capital increase. Because the "permissible borrowing limit" had already

⁵⁸¹ Minutes of the managing board meeting of July 28, 1969; BASF RA.

⁵⁸² Minutes of the managing board meeting of October 6, 1969; BASF RA.

⁵⁸³ Minutes of the managing board meeting of January 15, 1970; BASF RA.

⁵⁸⁴ Minutes of the managing board meeting of March 2, 1970; BASF RA.

been reached or even exceeded, “the volume of possible investments [had to] be determined solely by cash flow” as of 1971. This shackle would inevitably have made BASF lag seriously behind the general development in chemistry. It was necessary to break out of this circle by “using every means to push the pace” of the Group’s “efforts to earn.”⁵⁸⁵

Affairs escalated instead. At mid-year the operating results languished 48 percent below target, turnover lagged far behind expectations, the costs of materials were rising, the reserve fund had shrunk to half its volume, the dividend had not been fully earned, cumulative earnings were stuck at 14 percent below target and 0.7 percent below the results a year before.⁵⁸⁶ The sources of loss used to lie on the Group’s periphery, where they had become almost habitual, but these trouble spots were closing in. The foray into the German fiber business was being penalized with monthly losses of DM 7 million, and observers in banking and the stock exchange were frankly stating that the next problematic cases would appear in another new area, potash, as well as in the classical nitrogen business. The rumors had substance, for the losses that fertilizers were producing were not just massive; they were already deep-red *cash* losses, meaning that depreciation could not cover them to any notable extent.⁵⁸⁷

The greater danger was the company’s liquidity position. In August 1970 Magener had to concede “that practically no liquid reserves existed any more, except for securities that should not be touched.” On the managing board shortly before that point, he had won the debate with Heintzeler about allowing two interlocking participations in the Bochum Westfalenbank to be ceded to the Bayerische Hypotheken- und Wechselbank, in essence selling some of BASF’s “silver plate” to prevent worse.⁵⁸⁸ After all the efforts to reduce inventories and investment fell short and when a certain reticence in credit transactions with BASF became noticeable, especially among foreign banks,” Magener again pointed out the “extraordinary seriousness of the situation” and threatened there would be “consequences” if action were not finally taken.⁵⁸⁹ Not all his colleagues on the managing board shared his conservative assessment. Willi Danz, the managing board member responsible for the production area and the new fiber business, still asked – quite in the spirit of Magener’s profit planning – “whether it is really suitable to ease off on the Group’s indebtedness so much that highly interesting and optimally profitable projects cannot be conducted until further notice.”⁵⁹⁰ He proposed instead that strict adherence to SEC accounting rules be postponed a few years. He met with no approval.

⁵⁸⁵ Minutes of the managing board meeting of April 6, 1970; BASF RA.

⁵⁸⁶ Minutes of the managing board meeting of August 24, 1970; BASF RA.

⁵⁸⁷ Minutes of the managing board meeting of March 2, 1970; BASF RA.

⁵⁸⁸ Minutes of the managing board meeting of May 25, 1970; BASF RA.

⁵⁸⁹ Minutes of the managing board meeting of August 24, 1970; BASF RA. ⁵⁹⁰ Ibid.

Magener's conservative financial policy was considered indispensable by the board unless one wanted to exchange the company's first-class reputation for one of an excessively indebted company and jeopardize the capital increase that was absolutely necessary. At the extraordinary shareholders' meeting in November 1970, Magener stated the workability of the "golden cage of strict accounting principles in which we have locked ourselves through the AG and not, say, on account of pressure from the banks." It was one of the key arguments for winning the capital increase of a nominal DM 100 million at an issue price of DM 115.⁵⁹¹ Danz isolated himself on the essentials of the matter as well. To his colleagues, a "promising fiber business" seemed possible only if one was willing to invest a billion marks into this area. But a sum like that, if it were available in the first place, could be used elsewhere in the Group "more beneficially," so extrication from the fiber business was more likely than an even greater commitment to it.

A Calamitous End: The Collapse of Phrix

BASF's entry into the fiber business, which began in 1966 with the expansion of DOW Badische and first climaxed with the takeover of Phrix AG in Hamburg in January 1967, was symptomatic of the crisis. After BASF had firmly decided to start manufacturing fibers in 1962, Phrix was in principle among the possible partners for a strategy of forward integration into the processing of fiber raw materials, a field in which BASF had long been one of the largest producers. Phrix had been founded in 1938 with its focal point first in Silesia and other areas of Germany's war economy in the eastern part of the country. In the 1950s it merged with Rheinische Kunstseide AG, Krefeld, and Chemiefaser AG, Siegburg, and in 1951 took over Okriftel am Main, a cellulose factory, later building another major chemical fiber plant in Neumünster, Holstein. The Phrix Group also included 10 subsidiaries, some of which operated as trading companies, textile plants, and manufacturers of special machines for the chemical fiber industry. Chemical fibers accounted for 88 percent of Phrix's turnover of DM 258 million (1965), of which only 22 percent came from synthetic fibers and filaments.⁵⁹² Most of the turnover was generated with viscose staple fiber and rayon, a silk produced chemically from cellulose. From the outset Phrix was a BASF customer. BASF would have already had an opportunity to acquire a third of Phrix's share capital in 1958 but had to pass it up on principle.⁵⁹³ Even after the decision to go into processing, the Hamburg spun fiber producer was not among the preferred

⁵⁹¹ Comments by the chairman of the managing board, Professor Bernhard Timm, and the managing board member Dr. Rolf Magener, extraordinary shareholders' meeting on November 17, 1970, p. 11.

⁵⁹² Bauer, *Chemiefaser-Lexikon*, p. 58.

⁵⁹³ Minutes of the managing board meeting of October 6, 1970; BASF RA.

partners. The entrepreneurial value of Phrix was dubious because the company had not succeeded in shifting its focus to the more auspicious markets for synthetic fibers. BASF would have preferred Glanzstoff (VGF), whose annual turnover of DM 115 million (1963) put it second only to Deutsche Raiffeisen-Warenzentrale (DM 195 million) and before Hoechst and Bayer on BASF's list of best customers.

VGF was BASF's first choice in marketing and technology as well. After tedious negotiations in 1965, however, VGF's parent, AKU, ceased cooperation on processing once and for all. Only then did BASF turn its interest to Phrix, with which BASF had worked in the area of applied engineering in the PAN fiber area since 1962. Ludwigshafen had been "carefully" observing Phrix's development on the stock market since 1965, although the question of acquiring the company was still hotly debated between the sales department and the department of technology and engineering.⁵⁹⁴ Nevertheless, BASF sought direct contact with the head of the Phrix managing board to gain "a clear picture," but there was ample doubt as to "whether the quality and work area of Phrix are such that the very high expenditures associated with an acquisition [would be] worthwhile." Expenditures in this context were understood to mean not only the takeover price but also – with regard to AKU – the danger "that a BASF stake in Phrix could result in what for BASF would be a disadvantageous realignment of our customers for fiber raw materials within the EEC."

In October 1966 Danz finally managed to win over both managing boards with a technological argument for BASF's involvement in the Hamburg company. He was convinced "that BASF's previous attitude would fundamentally change if we could make a genuine contribution and set a joint technological development in motion with an innovation like Novolen"⁵⁹⁵ – a new, very promising BASF plastic produced from polypropylene for use as flat yarn, woven ribbon, and staple fibers in the extrusion processes employed in the manufacture of fabrics used for technical purposes rather than for consumer textiles. Indeed, the Phrix managing board chairmen Michael Zahn and Franz Kaiser were "greatly impressed" when Danz showed them samples of Novolen he had brought to Hamburg (spun filaments and ribbons suitable for manufacturing fabric) and named the price of the polypropylene. Cooperation between the two companies seemed to serve both. BASF gained captive use for its primary products and established itself in the processing stage through controlled markets. This positioning was all the more important because completion of the planned caprolactam factory in Antwerp would give BASF a record capacity of 180,000 tons. Phrix was "extremely interested" in an integration with a strong partner, without which it could no

⁵⁹⁴ Minutes of the managing board meetings of August 2, 1965, and November 8, 1965; BASF RA. See also section 7.

⁵⁹⁵ Minutes of the managing board meeting of October 4, 1970; BASF RA.

longer survive in the rigorous competition with its major rivals on the fiber market. It took only a few days for agreement to be reached on a “friendly takeover” and for BASF to purchase the Dresdner Bank’s block of shares representing 12.5 percent of Phrix’s share capital as a foundation.⁵⁹⁶

The “Phrix gentlemen” took this opportunity to report for the first time about major erosion in their company’s earnings position, which boded ill for a dividend payment for 1966. They contended, however, that Phrix’s capital structure and liquidity was to be judged as good and that the company only lacked young managers and long-term planning. Magener and Heintzeler found this news reason enough to relaunch discussion about “whether BASF should finally declare its disinterest.”⁵⁹⁷ But the managing board stuck by its decision to go through with the friendly takeover, so on January 20, 1967, BASF made the Phrix shareholders an official exchange offer after first accumulating more than a 25 percent stake in the company.⁵⁹⁸

Faced with the choice of either keeping their Phrix shares without expectation of a dividend and a future, or of exchanging them for BASF shares for which a 20 percent dividend had been announced, the Phrix shareholders had little trouble making up their minds. Most of them exchanged a nominal DM 100 from their holdings for a nominal DM 50 in BASF shares and received an additional DM 10 in cash to even up the market values of the shares. The Phrix factories continued operating under their old name and management. To shed the “rest of the outside shareholders,” BASF integrated Phrix into the corporation according to the amended Stock Corporation Act of 1966 and compensated the shareholders still resisting the exchange offer (who represented 3 percent of the share capital). The parent company subsequently had to accept liability for its subsidiary’s accumulated losses and all payables. In return, the parent itself was permitted to claim as a tax expense all compensation payments it paid, if the subsidiary was unable to offset them on its own within five years.⁵⁹⁹

These provisions initially seemed to be gray theory, although rumors soon surfaced that Phrix was worse off than had been candidly admitted, for the company “had contracted with its customers at ruinous prices throughout 1967.”⁶⁰⁰ To a certain degree, BASF’s managing board had anticipated such risks in its purchase decision. It knew that Phrix could not be more than a platform, an immense technological laboratory that would enable Ludwigshafen researchers and engineers to experiment with innovative

⁵⁹⁶ Minutes of the managing board meeting of October 17, 1970; BASF RA.

⁵⁹⁷ Minutes of the managing board meeting of December 19, 1970; BASF RA.

⁵⁹⁸ Press notice of January 20, 1967, attachment 1 to 4/67; BASF RA, minutes of the managing board.

⁵⁹⁹ Heintzeler, Rechtliche Möglichkeiten für den Anschluß von Phrix an die BASF-Gruppe, February 28, 1967, attachment 8 to 8/67; BASF RA, minutes of the managing board.

⁶⁰⁰ Minutes of the managing board meeting of May 16, 1970; BASF RA.

know-how in fiber processing at BASF's own high cost. The risk entailed by the takeover receded even further in October, when Dow declared its willingness to acquire half of the shares in order to operate Phrix as a joint venture with BASF, as was already the case with DB and Lurex.

More serious was the impact that the purchase of Phrix had on BASF's standing with VGF. As a chief customer and privileged cooperation partner of BASF, VGF saw the transaction as a violation of its contractually guaranteed special relations and felt that "BASF was in breach of contract with VGF in every way because of the Phrix acquisition."⁶⁰¹ The VGF managing board was "shocked" and horrified by the "shambles" that BASF had made of their mutual relations.⁶⁰² VGF had known the pre-acquisition conditions at Phrix better than the buyer and more than once had itself weighed participation before finally rejecting the idea as "hopeless." Given the "catastrophic situation" with viscose staple fiber and the falling prices for synthetic fibers, the Wuppertal company had "no longer counted on drastic improvement." VGF concluded that "if BASF – according to Glanzstoff's estimates – sinks around DM 150 million into such a company, then it must be pursuing major plans in the plastics area." With the tight market to be expected for years to come, VGF figured that this maneuver was bound to lead to a conflict of interest between it and BASF. The confidential relationship, "in which Glanzstoff as a customer had not always conducted itself in a strictly businesslike manner," now therefore inevitably had to become "a completely normal supplier-customer relationship," and Glanzstoff would use "every means of pressure" at its disposal in a buyer's market. With Glanzstoff's annual turnover having grown to DM 153 million over the years, this change of heart was not a threat to be taken lightly in Ludwigshafen.

At first it seemed as though the new acquisition in Hamburg was well under control. Having to choose between manipulating the Phrix balance sheet to show a small profit, a small loss, or a break-even result, BASF opted for the safe variant. The first balance sheet after the acquisition showed a loss of DM 6.5 million.⁶⁰³ In March, Aweta acquainted the Phrix management with all its possibilities for using the newest refinements of applied research and development to help the ailing plant back on its feet.⁶⁰⁴ Nevertheless, Ludwigshafen was surprised by the prospect of an "unmanipulated" loss of DM 28 million for 1968.⁶⁰⁵ More than one-third of that amount came

⁶⁰¹ Minutes of the managing board meeting of March 23, 1970; BASF RA.

⁶⁰² Freiensehner, Note "betr. Glanzstoff," February 23, 1967, attachment 9 to 8/67; BASF RA, minutes of the managing board.

⁶⁰³ Danz to the members of the managing board, "betr. Phrix," March 2, 1967, attachment 6 to 8/67; BASF RA, minutes of the managing board.

⁶⁰⁴ Günther D. Daumiller [division head] to Professor Timm, "betr. Besuch von Herrn Dr. Kaiser, Phrix-Werke AG, Hamburg, am 1.3.1967 in Ludwigshafen a. Rh.," March 3, 1967, attachment 7 to 8/67; BASF RA, minutes of the managing board.

⁶⁰⁵ Minutes of the managing board meeting of October 4, 1970; BASF RA.

from cash losses on viscose staple fiber, 180 types of which constituted an area of such bewildering diversity that rationalization was urgently needed. Moreover, doubts grew about the quality of Phrix's top management. BASF's plans to expand and modernize the synthetic capacity of the Neumünster factory with new investments of DM 58 million prompted withering protest from Glanzstoff, which imagined itself being double-crossed again.⁶⁰⁶ Part of BASF's strategy to placate Glanzstoff had been to portray Phrix's future role as that of a "massive hi-tech unit," a description hopelessly at odds with the major investments BASF envisaged. The remonstration showed up in the sales department's order books as well, for Glanzstoff henceforth concluded contracts with other suppliers whenever possible.

Even with the seller's market that prevailed until early 1970, it was apparent that the manufacture of viscose staple fiber was unsustainable unless one wanted "to invest great sums for low returns."⁶⁰⁷ To make matters worse, the fact that viscose staple fiber and rayon were the weakest earners in the product range meant that they were hit especially hard by the upward revaluation of the West German mark in October 1969. More important in the long run, however, were difficulties with ensuring steady procurement of favorably priced viscose staple fiber. The production of acrylic fibers, which Phrix made in Krefeld and sold under the trademark Redon, suffered from the small capacity of 7,500 tons (which ruled out economies of scale) and from dependence on Bayer for the raw materials. As with the manufacture of viscose staple fibers, the obvious thing should have been to shut down operations. From a long-term perspective, though, this response was not a solution. Instead, the managing board agreed that "[i]f BASF wants to stay in the synthetic fiber business not only in the framework of Dow Badische but also in the framework of Phrix, the only remaining option in the long run will be to 'seize the bull by the horns.'" There was not much room left for that, either. Glanzstoff's hostile reaction was not all that blocked the otherwise basically desirable expansion of polyester capacity; BASF also lacked secure access to the most important raw materials, such as terephthalic acid.⁶⁰⁸ This process of elimination led to contemplation of the perlon business, but growth in that area had lagged behind production of nylon-6,6. Although it was speculative to draw a parallel to the decline of cellulose, caution seemed wise. Nylon-6,6 had not yet been produced at Phrix, and Phrix's marketing experience in the entire area of synthetic fibers was modest.

⁶⁰⁶ Glanzstoff AG to the managing board of the Badische Anilin- & Soda-Fabrik AG, July 3, 1968, attachment 1 to 23/68; BASF RA, minutes of the managing board. See also the sales report, attachment 1 to 26/68; BASF RA, minutes of the managing board.

⁶⁰⁷ Summary by the Production Department for October 1969, November 17, 1969, attachment 5 to 33/69; BASF RA, minutes of the managing board.

⁶⁰⁸ Looking back, Matthias Seefelder sees this lack as the main cause of the Phrix debacle. See the interview on December 2, 1999, in Ludwigshafen, the record of which is in BASF UA.

It is thus no wonder that the need for DM 100 million in depreciation arose as early as July 1970. Of course, the fiscal authorities bore nearly 60 percent of the burden through lost taxes.⁶⁰⁹ It seemed at the start that the depreciation could be absorbed if business were to pick up, but conditions speedily deteriorated further in the summer of 1970. BASF now had to reckon with a loss of DM 66 million for the year, not counting losses due to closure. The need for depreciation also had to increase "if a clean sweep is to be made."⁶¹⁰ The Krefeld and Okriftel factories were closed, and the production of viscose staple fiber in Siegburg was discontinued. Up to 4,000 employees faced the threat of losing their jobs. The Phrix debacle created a public sensation. Even the liberal financial press viewed it as a litmus test for the credibility of the social market economy.⁶¹¹ The severance package that was agreed upon after intense negotiations with the unions provided DM 18 million for settling with the approximately 3,000 employees who were ultimately affected.

Cessation of activity in the cellulose area was only the first step to ending the crisis, however. In the unanimous opinion of the managing board members, what remained of Phrix was not viable for long, either. Keeping it alive made sense only "if Dow and BASF intend to make the rest of Phrix a crystallization point for an expansion of the synthetic fiber business, which will involve great investments for years."⁶¹² Both owners were a far cry from doing anything of the sort. Yet the total liquidation of Phrix had to be avoided, too. Not only would it have meant writing off the entire book value of the participation – approximately DM 155 million – it would also have cost an additional DM 50 million as a share of the liquidation losses.

In the end, neither Dow nor BASF could afford "to let a joint subsidiary go bankrupt." BASF therefore sought a third route, one that was supposed to avoid "considerations of prestige." In terms of business policy, it seemed purposeful and justifiable for the rest of Phrix to keep operating if BASF and Dow wanted to maintain "a sizable experimental fiber plant and a kind of applied engineering department for fibers" in order to commence mass production of synthetic fibers in Europe, too, someday. This aim was, of course, completely out of the question for Dow. BASF, too, had to part with illusions that had long been inconsistent with the financial realities involved. This truth applied even more to Steinhofer's suggestion that Phrix ought not be "cannibalized" but rather used as a "specialty cabinet with highly interesting modern technology."⁶¹³ The managing board instead envisaged

⁶⁰⁹ Minutes of the managing board meeting of July 9, 1970; BASF RA.

⁶¹⁰ Minutes of the managing board meeting of August 3, 1970; BASF RA.

⁶¹¹ See, for example, Peter Sweerts-Sporck, "Kapitalismus: Der Fall Phrix – ein Prüfste," *Der Volkswirt*, 35, August 28, 1970, p. 10.

⁶¹² Minutes of the managing board meetings of August 3 and 17, 1970; BASF RA.

⁶¹³ Minutes of the managing board meeting of October 19, 1970; BASF RA.

the “working hypothesis” of totally writing Phrix off and had Heintzeler look into how the DM 155 million necessary for it could be covered by extraordinary income.

The Phrix crisis claimed victims on the BASF managing board as well. The meeting on November 5, 1970, opened with Timm informing his not entirely surprised colleagues “that Danz – as feared – will be absent for some time for reasons of health.”⁶¹⁴ It was stated that their colleague had requested an extended leave, which the supervisory board had granted. The illness was no pretext. The events of the past weeks and months had taken their toll on Danz. The circumstances of his departure, the aloof and businesslike execution of the formalities within the managing board, the swift loss of nearly all his functions, and the tethers placed on his remaining ones all tend to indicate dismissal. The 58-year-old had joined BASF in 1937 and had succeeded Timm as head of production, joining the managing board in 1965. It was not long before he had acquired a name for himself as “crown prince.” As director of the plastics and fibers department, he had also been directly accountable for Phrix since the summer of 1970, was the chairman of its supervisory board, and had been both an early advocate of the Phrix acquisition and one of the last people to let it go. He therefore justifiably bore managerial responsibility for the fiasco. According to the German Stock Corporation Act, the managing board ought to have assumed overall responsibility; under the conditions of corporate governance actually prevailing in Ludwigshafen, it clearly should have been Timm.

It was this connection that Wurster alluded to when he stepped in to protect Danz at the extraordinary shareholders’ meeting on November 17. At Phrix’s administrative center in Hamburg, Hans Albers had sat on the board as BASF’s watchdog since October 1967. Lack of proper supervision, certainly an important factor in Phrix’s abrupt demise, was indisputably a charge to be leveled also at him, Seefelder’s successor as chairman of BASF’s managing board.⁶¹⁵ If Danz carried blame for the German misadventure in fibers, he was not the only one. His eclipse, unique in the top management of BASF in the twentieth century, saved both Timm and Albers from being contaminated by the reproach of failure in the company’s biggest plight since its refounding.

The alternatives “sell for scrap” and “voluntary liquidation” were pitted irreconcilably against each other in the dispute with the ever more hostile partner Dow until May 1971. However, the corner was turned when Phrix’s Neumünster factory, the choicest part of the moribund spun fiber manufacturer, was sold to Gelsenberg: At least liquidation damages were no longer a

⁶¹⁴ Minutes of the managing board meeting of November 5, 1970; BASF RA.

⁶¹⁵ In retrospect, Seefelder saw the responsibility for the lack of supervision at Phrix as lying more with Albers than with Danz, “who had been sacked as a ‘scapegoat’ for Timm.” Interview on December 2, 1999, in Ludwigshafen; BASF UA.

factor. The supervisory board also agreed to the complete closure of the Siegburg site after a severance package had been negotiated.⁶¹⁶ Now only Group subsidiaries such as Neumag, the ultramodern machine-builder that specialized in textile machines, remained on the list of the fire sale that accompanied the voluntary liquidation of Phrix. After liquidation of the closed and sold assets, the home office of Phrix AG, which had become the holding company, had only 100 employees left to manage the remaining subsidiaries, whose total workforce had shrunk to 2,700.⁶¹⁷ Further losses of DM 70 to 75 million had to be absorbed in 1971. By taking over the Dow half of Phrix at a reasonable price, BASF at least ensured itself a free hand to cope with the collapse as smoothly and economically as possible.⁶¹⁸

Danz had pointed out a feasible path back in October 1970: "By including suitable, highly profitable companies in the corporate shell, it appears possible to offset some of Phrix's accumulated losses against the taxable income of these companies."⁶¹⁹ The opportunity to do so came in February 1972 with the reorganization of BASF's lacquer area. It originally stood under the name BASF Lack-Chemie GmbH, but it now became part of the new affiliated paints and fiber corporation called BASF Farben + Fasern AG, for which Phrix served as the absorbing company. Phrix was simultaneously renamed BASF Spinntechnik AG and its share capital slashed from DM 154 million to DM 24 million as of December 31, 1971.⁶²⁰ The new company opened its headquarters in Phrix's former home office on Stephansplatz in Hamburg.

The Phrix crisis was only the tip of the iceberg. But the worst scenario – outright bankruptcy – had been prevented, and the voluntary liquidation had kept the losses within limits. This fact also helped consolidate the financial crisis of the BASF Group. The brakes that had been applied in the Group at the climax of the Phrix disaster gradually began to take hold. Desperation had meanwhile deepened the cutbacks from the originally foreseen DM 200 million to DM 493 million, sparing no one as previously approved projects were now suspended – a steep decline in the investments of BASF AG. Legally independent subsidiaries, too, were reined in so that they would not solve their finance problems themselves with their own cash flow in mind. Basant had to cancel the order for the caprolactam factory when the plant builder, Koppers, pressed for clarification of the situation. The Antwerp plant for manufacturing polyurethane raw materials received no approval at all. The paint project of BASF Argentina in Rosario likewise slipped onto the list of the planned activities that were stayed.⁶²¹

⁶¹⁶ Minutes of the managing board meeting of May 17, 1971; BASF RA.

⁶¹⁷ Minutes of the managing board meeting of July 19, 1971; BASF RA.

⁶¹⁸ Minutes of the managing board meeting of December 4, 1971; BASF RA.

⁶¹⁹ Danz to the members of the managing board, October 5, 1970, attachment 2 to 44/70; BASF RA, minutes of the managing board.

⁶²⁰ See section 9 on this point.

⁶²¹ Minutes of the managing board meeting of September 21, 1970; BASF RA.

These efforts still did nothing to improve the prospect for 1971. On the contrary, the financial gap yawned wider than ever. The difference between cash need and cash flow came to at least DM 1.2 billion, but the finance department could contribute only DM 350 million through new borrowing to cover the disparity. The rest had to come from another round of reductions in investment and personnel.⁶²² The “extraordinary uneasiness” that this financial consolidation triggered in the banking world and on the stock exchange was shared by the works council representatives on BASF’s economic committee. All of these parties, each from a different perspective, evidently feared that the managing board no longer had the enterprise “firmly under control.”⁶²³ When the Deutsche Bank requested Magener for the first time to fill out the liquidity form obligatory for “normal” customers, the works council ironically saw the “5,000-employee increase in personnel since 1965 as an undesirable trend” that was now leading to overreactions. Actually, the crash program for 1971 was designed to pare the Group’s workforce to 94,000 employees, that is, 2,000 fewer employees and an attendant savings of DM 93 million. This objective was formally agreed upon, although the division directors declared it “unrealistic.” By the end of the year, though, the workforce had thinned by as many as 3,063 people, with Ludwigshafen accounting for 1,778 of that total. For the first time since the refounding of the company, BASF also saw itself forced to forego the accumulation of additional reserves and to lower the dividend rate from 22 to 15 percent.

BASF finally managed to consolidate its budget in 1972 by adapting the amount of investment to the expected volume of depreciation (DM 975 million) and by capping the payroll. Of the 112 investment projects stopped during the crisis, 48 were resurrected. The accounts for the rest of them had to be settled by 1971 through DM 10 million of special depreciation. It was still too soon to sound the all-clear signal. The international foreign exchange markets had been unpredictable ever since the United States abandoned gold convertibility for the dollar in August, an act that released the other members of the International Monetary Fund from the obligation to keep the dollar exchange rates of their own currencies within predetermined limits. After analyzing the most recent measures of credit and monetary policy, Ludwigshafen even feared a major economic crisis was rapidly brewing and could lead to heavy losses in its export business.⁶²⁴ The Labor-Management Relations Act passed by the Bundestag in November dampened the mood still further. Backed by the managing board, Wolfgang Heintzeler, who led BASF’s department of legal affairs and taxes, had been particularly outspoken in the CDU’s business council when it came to resisting the act’s provisions for expanding the works council’s rights of participation and codetermination. Given the fickle state of the economy, the DM 440 million in interest paid

⁶²² Minutes of the managing board meeting of October 30, 1970; BASF RA.

⁶²³ Ibid. and minutes of the managing board meeting of January 18, 1971; BASF RA.

⁶²⁴ Minutes of the managing board meeting of October 19, 1971; BASF RA.

by the BASF Group remained “a dangerous burden” that kept rekindling debates about putting “saleable assets” on the block by the end of 1971.⁶²⁵ Despite appreciable gains in profits by mid-1972, the managing board still had no reason to loosen the restrictions much.⁶²⁶ Things did not turn around until the second half of the year. The crisis ended with a paradox. Although the public and probably also the top management itself believed that the financial turbulence had hit BASF harder than any other company, the numbers substantiating BASF’s financial soundness were better than those posted by Bayer and Hoechst. Ludwigshafen’s debt of DM 5 billion was DM 1 billion less than Bayer’s and DM 1.8 billion less than Hoechst’s.⁶²⁷ Still more surprising was that when the new growth spurt began, Ludwigshafen put priority on diminishing its debt. By 1974, BASF had a debt of DM 4.2 billion to service, only half that of either Bayer or Hoechst.

Upheaval and Persistence: Corporate Reorganization

With the initial signs of the squeeze on profits and finances in mid-1967, the organization of the company came under scrutiny first. Each member of the managing board knew that the ability of BASF’s corporate structure to cope with the challenges of the new course was waning and therefore becoming a cause of the crisis.⁶²⁸ The members quickly agreed “that the organization of the Group had not kept pace with the precipitate growth of recent years and that it needed to be improved.” Thoughts of forming BASF AG subsidiaries led by “submanaging boards” had surfaced a year earlier, but the suggestion seemed “impracticable” and was immediately rejected this time, too. Now the need grew again “to broaden the base of entrepreneurial initiative and the responsibility for the results of individual lines of the business.” BASF was not the only major German enterprise to be looking in this direction. In many sectors of West German industry, the primacy of the market was rending the old forms of corporate organization and forcing the business community to think of final products, to organize along product lines, and to make clearly defined areas of business responsible for the result. Bayer and Hoechst, too, began reforming at almost the same time, particularly since the process of forward integration toward consumer-oriented markets had already gone beyond where it was in Ludwigshafen. For that reason alone, the transition from functional to divisional organization confronted BASF with special problems.

⁶²⁵ Minutes of the managing board meeting of November 15, 1970; BASF RA.

⁶²⁶ Minutes of the managing board meeting of June 6, 1972; BASF RA.

⁶²⁷ BASF, Finanzabteilung, “Finanzierungsvergleich zwischen BASF, Bayer und Hoechst,” May 26, 1975, attachment 6 to 1675; BASF RA, minutes of the managing board.

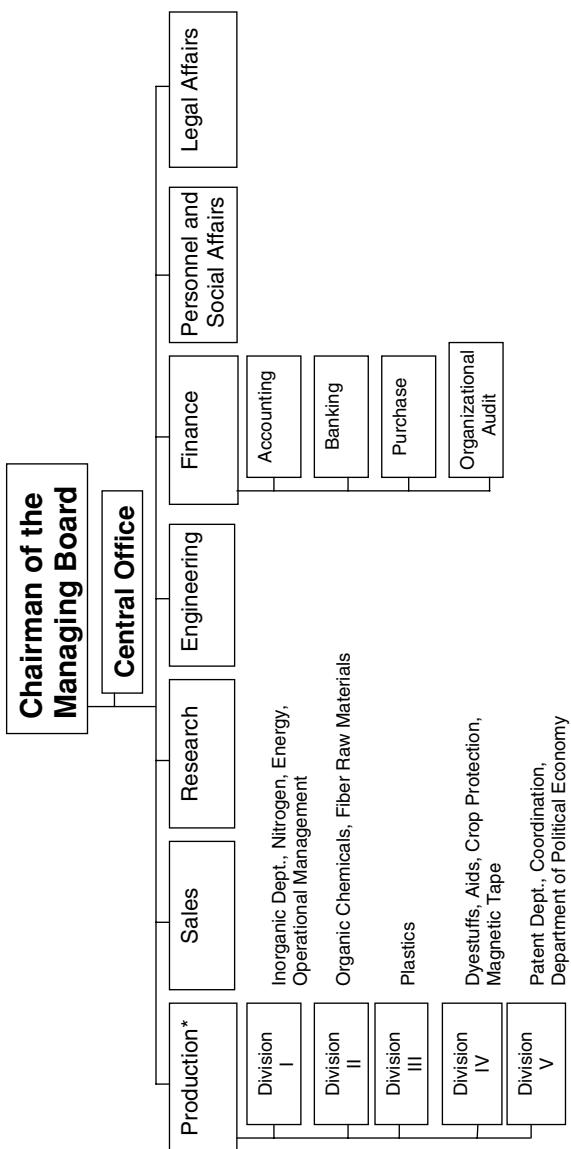
⁶²⁸ Minutes of the managing board meeting of June 14, 1967; BASF RA.

BASF had had experience with restructuring itself once before – when it had been compelled by relative stagnation in the beginning of the 1960s. Until that time, the company had relied on a classical functional structure consisting of departments. Sales, research, personnel and social affairs, energy, and legal affairs had answered directly to the managing board, where they had each been represented by their respective board member. The production area had consisted of several departments under the authority of the managing board. Two bodies harking back to the era of the trust, the Commercial Commission, or KK (known before 1953 as the Commercial Committee, or KA), and the Technical Committee, or TEA, had coordinated the overall procedure and had advised the managing board prior to any decisions affecting production or investment. This structure had predated BASF's refounding and had thus stemmed from a phase when IG Farben's divisional structure separated the Ludwigshafen works from the Oppau works in all important production and investment concerns. It had become obsolete and had had to yield to a mix of familiar and new arrangements. The hope had been that this change would stimulate growth, and indeed it had. The functional structure was tolerable during the reconstruction period, but as the company's functions gradually diffused, this structure became increasingly disruptive.

In late 1960 Julius Overhoff, who had just retired from active service, at last took on the task of seeking reform as an elder statesman, as it were, “because the company has reached such a scale that the organizational forms hitherto used are no longer adequate.”⁶²⁹ In the end it was agreed to pursue “the idea of decentralization and the establishment of focal points.” Recalling IG Farben's structure of production, the reorganization centered on the creation of four divisions whose directors were to have “substantial influence” beyond Ludwigshafen in their respective production areas (see Figure IV.12). Not only were they put in charge of the domestic production interests that the old structure could not tend to effectively, they were also given an important say in the “administration” of foreign participations and in matters of patents, trademarks, and licensing. In addition, they were key voices in decisions on the construction of BASF's own plants and those of third parties in both Germany and abroad. The new organizational schema strengthened the sales division, which operated essentially parallel to the product divisions and reflected what they made.

The greatest beneficiary of these reforms was the finance director, Rolf Magener, who had overseen the area since January 1962 and who now had jurisdiction over four formerly independent departments. Research was one of the biggest losers. The new corporate structure divided it largely among the divisions and confined basic research to the departments of the main laboratory, which dealt with neither plastics nor dyestuffs and aids. A

⁶²⁹ Minutes of the managing board meeting of November 21, 1960; BASF RA.



*Deputy chairman of the managing board

Figure IV.12. Reorganization of BASF AG (1962).

similar fate befell Aweta. It, too, had to be oriented more than before to the exigencies of productivity and was linked to the divisions on the one hand and sales on the other.⁶³⁰ The TEA no longer had a place, whereas the key functions of the KK survived in the central office. The horizontal interlocking of production and sales certainly meant a step toward a divisional structure, but the divisions lacked most of the entrepreneurial autonomy that would have made them decentralized, independent participants on the market.

This mix of functional and divisional structure suited BASF in 1961 because the company had only a few product lines that extended all the way to the final consumer. Although the company's stated objective since 1963 had been to change precisely these circumstances, the thought of transforming BASF AG into a holding company for decentralized, individual businesses had still come to nothing by 1966 because of the hybrid structure. Led by Magener, the members of the task force appointed in 1967 to reform the corporate organization were therefore skeptical as they went about their job of ascertaining "the degree to which the structure of the BASF Group permits the spheres of business to be turned into profit centers."⁶³¹ The task force reported that this idea could not be realized perfectly but that the creation of an "internally oriented raw materials division and possibly also an intermediates division" would seem at least to help move the company toward this goal. Magener's committee envisioned six "divisions oriented to the external market in terms of their products." At the outset it did not occur to anyone to bring in outside organizational consultants, as had become the fashion in West Germany in the late 1960s. The managing board itself was expected to work out the basic concept of the reorganization first. It seemed the only way to ensure that the operation would begin on January 1, 1968, as scheduled. The intention was to have a corporate consultant deal with the fine points later if necessary.⁶³²

But the fine points were precisely where the problems lay. In any case, the project had still not gotten off the ground by April 1968. To accelerate things, Timm finally sought advice about the direction in which a consulting firm could help in working out the details of a corporate reorganization.⁶³³ He had heard of the new organizational structure of Preussag (the Prussian state coal, iron, and steel holding founded in 1923), which had benefited quite well from the input of an external organizational consulting company. A discussion of Timm's with the managing director of McKinsey & Company, Inc. in Düsseldorf, John G. McDonald, led to two-hour one-on-one discussions between McKinsey and each member of the managing board as a basis for making an offer. Timm assuaged the skepticism of his colleagues by instructing

⁶³⁰ Minutes of the managing board meeting of November 24, 1961; BASF RA.

⁶³¹ Minutes of the managing board meeting of July 24, 1967; BASF RA.

⁶³² Minutes of the managing board meeting of August 14, 1967; BASF RA.

⁶³³ Minutes of the managing board meeting of April 4, 1968; BASF RA.

the consulting company not to make any judgmental comments about the persons spoken to.⁶³⁴ In July McKinsey submitted a “Memorandum of Proposals Strengthening Organisation Structure and Management Processes.” The consulting company promised to complete the reform within six to eight months, that is, by no later than April 1969, for DM 1.5 to 2 million.⁶³⁵ Acceptance of this offer was evidently decided by the start-up problems at Basant, where “lack of clear lines of authority” made it simply impossible to determine “who in Antwerp or Ludwigshafen bore responsibility for this or that failure.”⁶³⁶

In an interim report of December 1968, McKinsey listed familiar deficiencies to define the problem that reorganization was supposed to redress.⁶³⁷ In the five years since the strategic shift of 1963, BASF had acquired seven German and one foreign chemical company and had thereby taken the road of forward integration – and, in the area of oil and gas, backward integration as well. These acquisitions contributed 40 percent of the growth experienced by the BASF Group. Without them, the Group would have achieved only 7.8 percent instead of 12.6 percent annual growth and would thus have stood only slightly higher than the world average in the chemical industry (7.5 percent). However, all the subsidiaries, especially the foreign ones, were suffering from steadily declining profits, a sign of complications with the organizational integration of acquired enterprises. The report identified five specific management weaknesses that had to be overcome: unsystematic planning, ad hoc allocation of funds, lack of a group-wide management-information system, a want of systematic management development, and an absence of follow-up analysis of investment activity. In addition, McKinsey considered it necessary to recast the traditional corporate philosophy “in order to meet future demands.” The report went on to say that BASF would have to end “the unchallenged pre-eminence that the chemists had to the detriment of other functions”; the “research-oriented organizational planning, which comes at the expense of creativity”; rituals of collective decision making; the one-sided orientation to Ludwigshafen; and the “manufacturer mentality” that was hampering progress in marketing. The McKinsey consultants thus told the managing board what it already knew: that BASF presently did not have the organization, the management systems, or the leadership style for meeting its ambitious growth objectives.⁶³⁸ It recommended that the entire managing board participate collegially in strategic decision making

⁶³⁴ Minutes of the managing board meeting of May 20, 1968; BASF RA.

⁶³⁵ Minutes of the managing board meeting of July 8, 1968; BASF RA.

⁶³⁶ Minutes of the managing board meeting of July 15, 1968; BASF RA.

⁶³⁷ McKinsey, “First Intermediate Report – discussion with BASF’s Vorstand, January 13, 1969”; UAM, BAS 01 690113 II.

⁶³⁸ McKinsey to the managing board of the Badische Anilin- & Soda-Fabrik AG, “Ausrichtung der BASF auf die Zukunft,” May 8, 1969; UAM, BAS 01 690500 I.

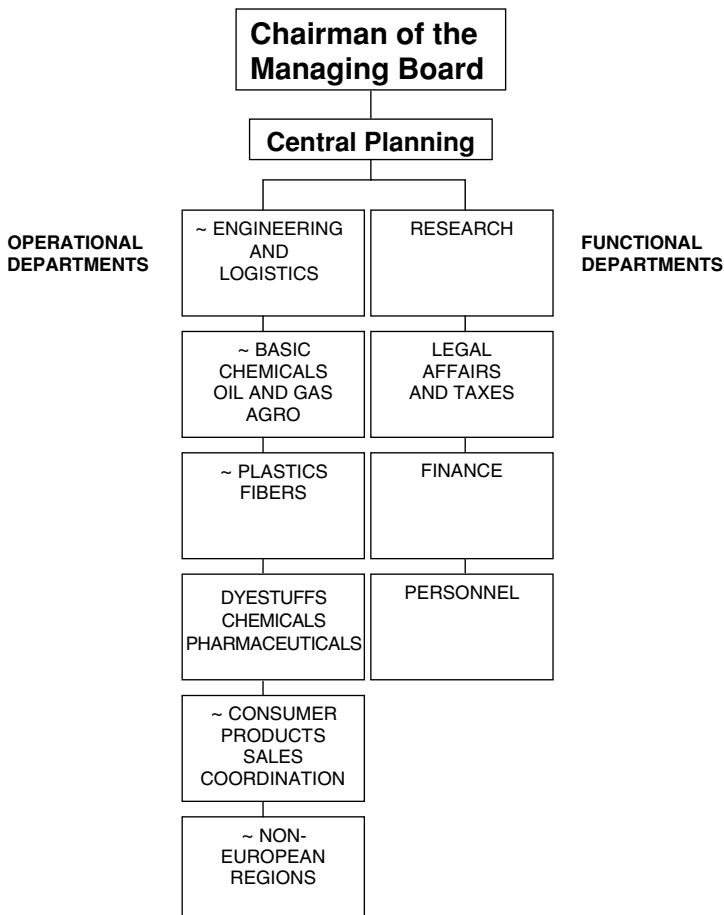
and make individual board members responsible for the operational management and control of specified production areas. BASF senior management had hitherto operated with two, but by no means equally warranted, heads – a chief executive office (CEO) and a chief financial officer (CFO) – while the other managing board members waived the overall entrepreneurial responsibility that the German Stock Corporation Act assigned to them. The only member of the managing board holding *de facto* veto power was Heintzeler, and that power was confined to technical and legal issues.

The new organizational structure was to consist of the chairman of the managing board (strategy and public relations), three managing board departments (finance and legal affairs, research and development, and management development), and six managing board areas. The six board areas were to embrace four groups of business areas, a geographical unit, and a functional unit. Each of these functional and operational departments answered to management charged with both profit and line responsibility for its products on the world market. McKinsey also proposed the creation of three new management systems: one for planning, one for controlling, and one for management development. The last of these three systems was regarded as especially urgent because the consultants judged that qualified managers would eventually be “the *scarcest resource at BASF*.” In late June McKinsey submitted a corresponding proposal, which Timm forwarded to the managing board with explicit instructions to pass it quickly.⁶³⁹ The first matter was the structure of top management, a model that would determine the areas of responsibility within the managing board. For follow-up reorganization of the second and third tiers, the consulting firm had practically already arranged to have itself brought in through late 1971.

All but two parts of the proposal were accepted (see Figure IV.13).⁶⁴⁰ In the first case, the plan to merge the managing board’s finance area with the area of legal affairs and taxes was not to be decided on as long as Magener and Heintzeler were still active. In the second case, the McKinsey suggestion to change the name of the personnel department to “management development” – so as to stress the systematic nature of what was involved – met resistance because it was too narrow and was contrary to “general sociopolitical considerations.” By contrast, the suggestion to change the name “Operations and Logistics” to “Engineering and Logistics” was only cosmetic in character. The reform’s impacts on personnel were tractable. Danz’s former post, chief of production, had become obsolete; instead, he was given the equally influential and problematic business area of plastics and fibers. Consumer products were now Freiensehner’s purview. Henkel took over the

⁶³⁹ Timm to the members of the managing board, “betr. Vorschlag zur Beschußfassung am 7.7.1969,” June 30, 1969, attachment 1 to 18/69; BASF RA, minutes of the managing board.

⁶⁴⁰ Minutes of the managing board meeting of July 7, 1969; BASF RA.



~ = The director of this department is on the managing board

Figure IV.13. Reorganization of the BASF Group (1970).

promising area called non-European regions, ascending with Danz into the category of “crown princes.” So did Moell, who moved from the personnel and social affairs department to the operational department named basic chemicals and thereby made way for Friedrich Dribbusch. Three new deputy members of the managing board – Dribbusch (personnel), Berthold Frank (engineering and logistics), and Horst Pommer (research and pharmaceuticals) – prepared the generational shift at the top. Seefelder, however, was not appointed as a deputy member of the managing board until October 1971, that is, after he had advanced to become the director of the newly created division of dyestuffs and aids.

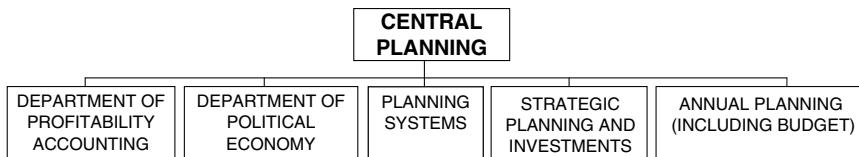


Figure IV.14. Organization of the central planning unit of BASF (1970).

The reorganization of top management was followed in July 1970 by the creation of 19 new, basic, second-tier operational units, for which the term *divisions* was used. They were congruent with the subordinate areas of the operational departments. The Wintershall Group, which had meanwhile been integrated into BASF, was included in these organizational reforms right away. The directors of the 13 product-oriented units bore the responsibility for all that happened with the business policy of their divisions, especially “for earnings (or costs) and for future planning.”⁶⁴¹ To promote the control function expected of the profit made by a division, the deliveries from one division to the next passed through the accounts at transfer prices based as much as possible on market prices. Each division director “normally” oversaw a production director, a sales director, and a research liaison man. Geographically, the jurisdiction of the production divisions encompassed Europe. When operating outside that space, they were obliged to work closely with the other four regional divisions – North America, Latin America, Africa and West Asia, and East Asia and Australia – “with the aim of coordinating and unifying BASF policy worldwide for the individual product groups.” The directors of the regional divisions carried responsibility not only for profits and future planning of their respective domains but also for exports, licensing policy, and foreign assets policy. The only exception was that the department of plastics and fibers continued to look after Dow Badische because of “the special conditions in the fiber area.”⁶⁴² The new basic organizational units also included the local managements of the Ludwigshafen works and Basant, which reported to the engineering department. The director of the Ludwigshafen factories was also “the worldwide point man” for questions about energy, safety, and technologies pertaining to exhaust gas, effluents, monitoring, and regulation. Another new staff unit was “Central Planning,” which replaced the central office and reported directly to the chairman of the managing board (see Figure IV.14).

McKinsey then went about drawing up “job descriptions for the senior positions of the newly created basic organizational units.” To prepare suggestions for filling the jobs, the consultants matched up the descriptions

⁶⁴¹ Basic decision of October 14, 1969, to restructure the BASF Group, attachment 1 to 29/69, BASF RA, minutes of the managing board.

⁶⁴² Minutes of the managing board meeting of January 15, 1970; BASF RA.

with anonymous job-profile questionnaires filled out by the relevant managing board member. For 25 second-line management positions, McKinsey even had a computer analyze the coded files on 65 candidates named by the board.⁶⁴³ These actions and similar ones did not exactly enhance the popularity of the consultants. The obtrusiveness and bromide of their presentations came across as “an affront,” and Timm let McDonald hear about it in every way.⁶⁴⁴ Ultimately, it was decided “that McKinsey terminate all [its] activity for BASF at the end of the year” (1971).⁶⁴⁵ Originally scheduled to last six to eight months, the consulting had stretched into more than two years of thorough reorganization.

The organizational reform of 1969–70 occurred during a slump, coming about under the pressure caused by the weak earnings performance of the newly acquired domestic and foreign subsidiaries. Similarly, the development of this corporate structure into a group organization that reflected the sustained growth of BASF’s global operations also began against a backdrop of weakening business activity, one that many contemporaries have since interpreted as the “world economic crisis” triggered by the 1973 oil price shocks. In 1975 the turnover and profit of the BASF Group declined again for the first time since 1970, signaling the onset of a difficult phase of growth. Albers was the driving force that re-ignited the organizational debate. In charge of dyestuffs, chemicals, and dispersions since 1974 – initially as a deputy member of the managing board – this former member of the Phrix managing board was among the champions of BASF’s internationalization. From his perspective, one of the prerequisites for the Group’s further growth was an organizational structure enabling BASF AG to take its place as an important, but in principle equal, member alongside the other companies of the BASF Group.⁶⁴⁶

Ignoring the status quo, he proposed the creation of a “parent company” that would assume overall responsibility for the BASF Group. As the supreme management body of the Group, it would set the group objectives, see to the worldwide planning based upon them, and coordinate and control all the group activities necessary to perform these tasks. It would also oversee the Central Planning Unit and two existing commissions – “fixed investments” and “financial investments” – that might be complemented by commissions for research, investment management, and personnel management. Albers suggested that five operational departments be represented on the managing board in addition to the four existing functional departments. The organizational chart of the Group’s operational area was to be based primarily

⁶⁴³ Minutes of the managing board meeting of September 23, 1969; BASF RA.

⁶⁴⁴ Minutes of the managing board meeting of July 20, 1970; BASF RA.

⁶⁴⁵ Minutes of the managing board meeting of October 19, 1971; BASF RA.

⁶⁴⁶ Hans Albers, *Die BASF-Gruppe*, August 1976; BASF UA, W 1 (personnel archive, Dr. Hans Albers).

on regions. But the departments, according to Albers, also had to assume responsibility for a product area. The region of Germany, in his opinion, should be divided into BASF AG and the other domestic firms. Directly beneath the level of the managing board would thus come five regions (Europe, the United States, overseas, and the two German ones) and two product lines. The strictly divisional structure would thereby have become a matrix that would have given the parent company the task of coordination. Albers's initiative was not acted on for the time being, however.

Ideas along this line were also pursued by Seefelder, who in May 1979 ushered in a new round of progress in the organization of the BASF Group. Basing his proposals on the holding company concept, which Albers had meanwhile revised,⁶⁴⁷ Seefelder was occupied with "further developing the organization of BASF for the 1980s in view of the changed economic and strategic circumstances." He sought to retain the time-tested principles but to eliminate the "weaknesses that had become obvious." McKinsey was involved again, the company having already been entrusted with the reorganization of the North American BASF companies in 1978.⁶⁴⁸ This time, Seefelder brought in the corporate consultants to conduct the introductory studies and prepare proposals. As always, McKinsey began by criticizing the existing organizational hybrid, which the consulting company had itself created. The structure was a "coexistence of product divisions, regional divisions, functional areas, and companies, without one organizational principle being dominant throughout."⁶⁴⁹ In contrast to the strategic objective of BASF, the company's core business was still focused largely on Germany and the rest of Europe. Few divisions outside Europe accounted for a notable share of production. Investment policy, too, underemphasized overseas markets. Two-thirds of BASF's managers had no significant experience abroad. The Group had no management development system. More than anything, however, BASF lacked a market orientation.

Seefelder was convinced that this latter point was one of the main problems. He and his advisors did recognize the strengths of the technology-oriented corporate culture, the technical expertise, and the innovative power of the economical, interlocking plant system, but they attached no long-term strategic importance to it. In their eyes, the shrewder move was the

⁶⁴⁷ Seefelder to the heads of the divisions and areas, "betr. Weiterentwicklung der BASF-Gruppenorganisation," May 22, 1979, and Albers (Ressort C) to Seefelder, "betr. Die BASF-Gruppe," June 11, 1979; both in BASF UA, W 1 (personnel archive, Dr. Hans Albers).

⁶⁴⁸ McKinsey & Company, Inc., "Organisatorische Neuordnung durch BAC zur Stärkung der Position in Nordamerika," December 19, 1978; BASF UA, W 1 (personnel archive, Dr. Hans Albers).

⁶⁴⁹ McKinsey, "Stärkung der strategischen Führung der BASF-Gruppe. Diskussionsgrundlage für die Zwischenklausur des Vorstandes über die Weiterentwicklung des Führungssystems for die 80er Jahre," October 1-2, 1979; UAM, BAS 46 791002.

“shift from industrial products to consumer-oriented products,” which they wanted to encourage. That area, however, was precisely where BASF’s greatest weaknesses lay: lack of mobility, inadequate international experience, and underdeveloped managerial skills. Overcoming these shortcomings was one of the motives behind the reorganization of the company. But there was another. To Seefelder and his team, BASF’s total assets were too concentrated on Germany. In view of the company’s high personnel costs and its social and environmental risks, earning power was therefore jeopardized. By comparison, the United States appeared to be the promised land. That was where they wanted to expand BASF’s additional focal point.⁶⁵⁰

The essential benchmarks of the reform were tailored to these two considerations. First, the managing board of BASF AG was supposed to position itself clearly as the managing board of the Group. Second, the worldwide responsibility for products and results was established “as the dominant organizational principle.” Third, the intention was to reinforce the entrepreneurial foundation by creating new areas of work, elevating the division directors to “worldwide directors of work areas,” and breaking the group down into as many market-oriented business units as possible (rather than functions). Fourth, the idea was to expand geographic responsibility to offset product dominance. These objectives could not be met with a flawless divisional solution. It was necessary to balance product interests and country interests. As Seefelder saw the issue, particularly in view of BASF’s tradition, the appropriate solution was “a matrix; that is, we have actually always had pressure to communicate in BASF, before the reorganization in 1969, too. One therefore cannot deny BASF’s ability to live with a matrix solution.”

Accordingly, the new organization provided for 12 departments on the managing board, with each – except for the board chairman – being assigned several line areas. Eight of the departments each bore worldwide responsibility for products and for one country area. Three departments were each accountable for one country area and one or more central areas (see Figure IV.15). The second tier encompassed 13 country areas, including BASF Ludwigshafen, and 22 business (or work) areas, which replaced the product divisions (see Figure IV.16). In principle, each work area embraced three units: technology and production planning, planning and controlling, and marketing. The matrix also included eight central areas performing functional tasks.

The matrix solution preferred by Albers had thus prevailed in the reorganization, but not the “primacy of regional management” that he had called

⁶⁵⁰ Seefelder, “Stärkung der strategischen Führung der BASF-Gruppe,” March 8, 1980; BASF UA, W 1 (personnel archive, Dr. Hans Albers).

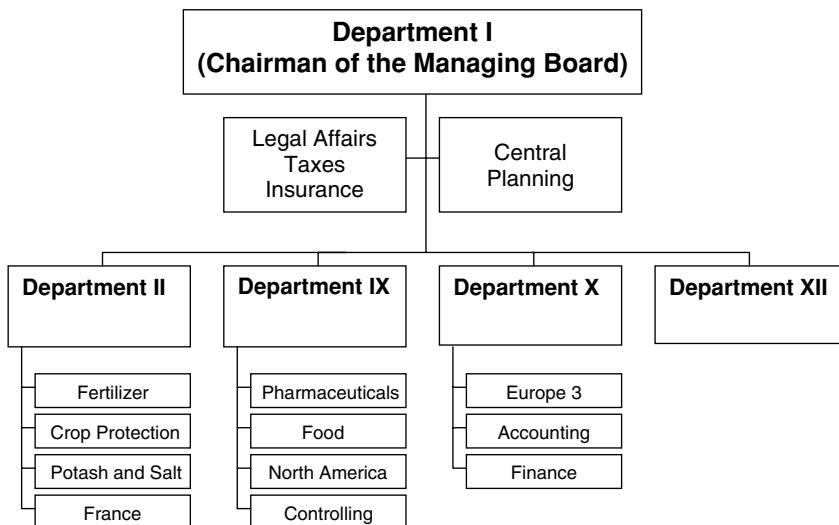


Figure IV.15. Organization plan of the managing board departments of the BASF Group (1981).

for.⁶⁵¹ Instead, the emphasis was on “product responsibility” as “the dominant organizational principle.”⁶⁵² However, the reorganization did go a long way toward accommodating Albers in one other point: BASF AG had become the *de facto* parent company. To reduce the acceptance costs of the new arrangement, though, it was not to be advertised to the outside world. Partly for this reason, McKinsey’s proposal for a “total transfer of the company seat” to Mannheim, Heidelberg, or Frankfurt am Main was rejected as “not very realistic.”⁶⁵³ In the end, even a move into another building outside the factory premises if possible, as had been envisioned for the managing board of the Group, was deemed inopportune.

Paradoxically, the most daunting obstacles to undertaking the global dimension of the corporate mission as organizationally prepared in the early 1980s lay at BASF’s own doorstep. Europe was still anything but a homogeneous market. The differences between the countries extended all the way to their languages and mentalities and had to be taken into account by

⁶⁵¹ Albers to Seefelder, “betr. Die BASF-Gruppe,” June 11, 1979; BASF UA, W 1 (personnel archive, Dr. Hans Albers).

⁶⁵² Seefelder, “Stärkung der strategischen Führung der BASF-Gruppe,” March 8, 1980; BASF UA, W 1 (personnel archive, Dr. Hans Albers).

⁶⁵³ Record of the decisions taken at the managing board’s off-site meeting on the further development of BASF’s leadership system, October 1–2, 1979, October 8, 1979; BASF UA, W 1 (personnel archive, Dr. Hans Albers).

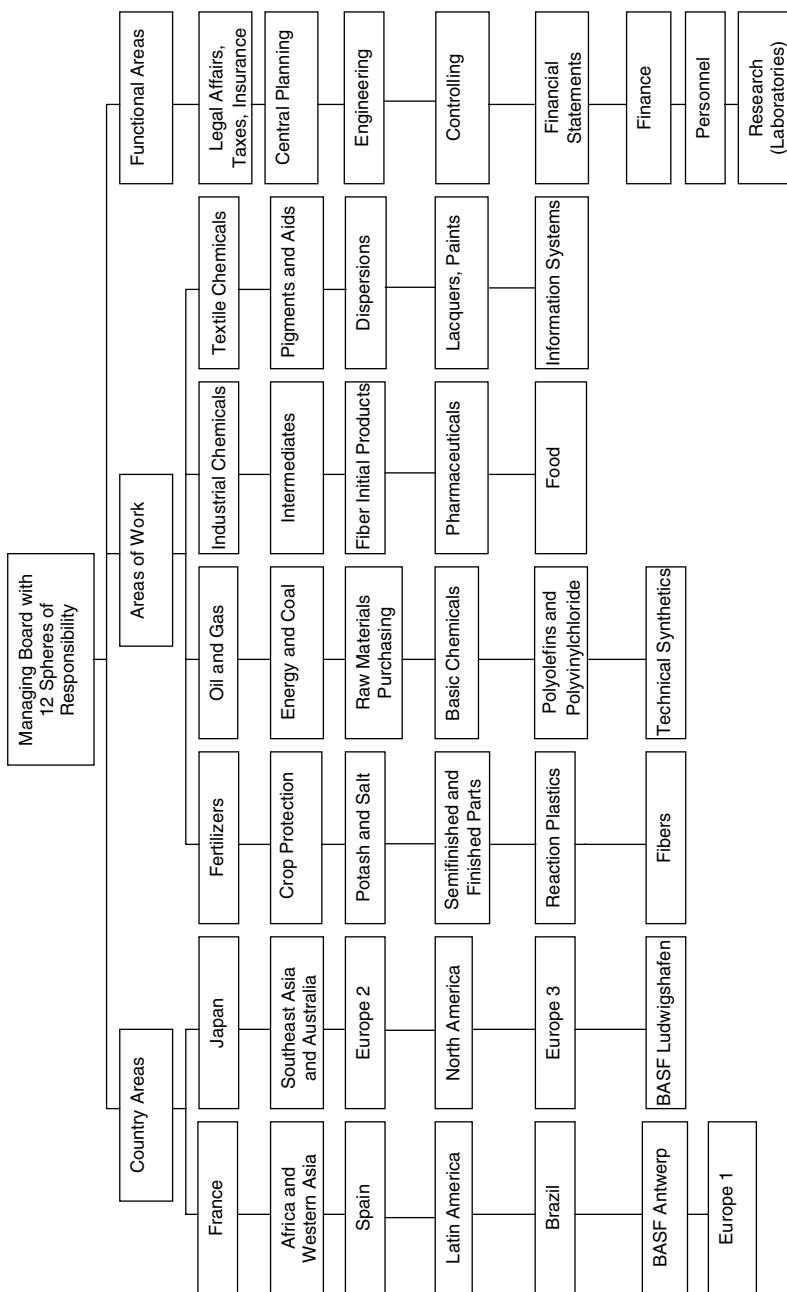


Figure IV.16. Reorganization of the BASF Group (1981).

Source: Organization of the BASF Group of December 31, 1981; BASF USA, CO.

“efficient units on site.”⁶⁵⁴ By contrast, the new corporate structure went some distance toward the expansion that Albers had energetically sought on the North American market after his appointment as chairman of the managing board in 1983. The acquisitions that he pushed through abroad in the mid-1980s made BASF a global player and put the new corporate organization to the test. Not until recently, again during an economic downturn, did BASF go beyond continuous change and adapt its corporate structure once more to new conditions, this time by enduring a “Triple F” (Fit for the Future) campaign.⁶⁵⁵ The reform is aimed at the second through fourth echelons of management, in other words, at the 35 area directors, the directors of business units, and the directors of subdepartments. In all, 600 managers are to receive more responsibility than they have had to date. The directors of the 38 regional and 10 global business units at the third level in particular are being elevated to entrepreneurs in charge of a product group’s research, development, production, marketing, logistics, and sales. As of 2003, BASF expects this new structure to save €400 million each year. The hope is that being “as centralized as necessary [and] as regionally and nationally decentralized as possible” will strike a productive balance between the decentralization of management responsibility and BASF’s interlocking, cooperative management, which relies on centralized decision making. The corporate areas of the first tier in the hierarchy will retain overall responsibility for their transactions but will focus more than before on strategic leadership. Their number has been cut from 16 to 12. The 11 country areas in the former structure have been consolidated into 8 and thus match more closely to the existing regional focal points than used to be the case. This reform has taught the basic lesson that global transactions tend to represent the exception in the BASF portfolio and that a regional approach to the market is the rule.

9. NO WEARY SHOP OF RAW MATERIALS: FORWARD INTEGRATION AND ACQUISITION

Off to New Shores

The primacy of profit-oriented financial planning and the new technological paradigm of fully integrated production structures was bound to have an effect on BASF’s corporate culture whereas the corporation’s business policy had hitherto consciously and voluntarily set limits that helped BASF concentrate its strengths and direct itself to areas of work where it could make the most of its comparative competitive advantages, these limits now threatened to block the way to the front ranks. On the surface, this change of view

⁶⁵⁴ Seefelder, “Stärkung der strategischen Führung der BASF-Gruppe,” March 8, 1980; BASF UA, W 1 (personnel archive, Dr. Hans Albers).

⁶⁵⁵ Strube, Feldmann, Fit for the Future, December 2000; BASF UA.

applied to the tacit division of labor between the successor companies of IG Farben. After the trust's breakup, the Big Three respected each other's territories, but the boundaries became more and more porous as the 1960s wore on. More important, however, were other self-imposed and customary constraints on entrepreneurial freedom of action. These restrictions that shaped BASF institutions became the company's corporate culture and defined the frame of reference of top management's decisions. Two of these principles etched sharply into BASF's history were now being called into question: the company's pronounced reluctance to build its own production plants abroad, and its fundamental refusal to go into processing.⁶⁵⁶ Both principles had existed in the old BASF and had lost none of their currency during the era of the trust, though they were partly imposed by that period's adverse global economic conditions.

BASF had always preferred to operate on the world market from home. This principle persisted long after 1945. Before 1964, Brazil was the only place where BASF had its own production plant, and even it was quite small. As before World War I, licensing, participations, and work on third-party projects were considered the last resort if this ideal arrangement did not exist. The members of the managing board agreed that the foremost goal of such activities had to be to ensure the sale of BASF products from Ludwigshafen.⁶⁵⁷ In negotiations for a commercial agreement with France, BASF's early threat to begin producing dyestuffs on the other side of the border was only a "tactical measure" resorted to in full knowledge "that the construction of a German dyestuff factory in France is scarcely being considered at this time."⁶⁵⁸ Ludwigshafen was prepared for engagement in foreign countries only if pressured, say, by indications that important markets such as the United States could not be maintained from abroad in the long run because of tariff policy or by legal issues involving patents. In 1958, for example, it seemed opportune "not to postpone Styropor production in France, for the possibility of a compulsory license on our patents cannot be denied, at least not totally."⁶⁵⁹ Thus it was that BASF had more than 102 foreign sales organizations spread across five continents in 1963, all controlled by BASF Holding AG in Zurich since the summer of 1961. But, it owned only nine production plants outside Germany and had a controlling interest of 92 percent in only one of them, the Companhia de Produtos Quimicos "Idrongal" in Guaratinguetá, Brazil.⁶⁶⁰ This pattern fundamentally altered in the 1960s.

The consolidation of the European Economic Community (EEC) and the speedy dismantling of tariffs in the Common Market of the six Member

⁶⁵⁶ Minutes of the managing board meeting of November 21, 1960; BASF RA.

⁶⁵⁷ Minutes of the managing board meeting of April 14, 1958; BASF RA.

⁶⁵⁸ Minutes of the managing board meeting of September 9, 1955; BASF RA.

⁶⁵⁹ Minutes of the 19th meeting of the Kommission für Technische Auslandsbeziehungen on January 22, 1958, attachment 1 to 5/58; BASF RA.

⁶⁶⁰ See the global overview given for the first time in the BASF annual report for 1963, pp. 28–9.

States as agreed in the Rome Treaties contributed to this change, but the EEC's effect on BASF's strategy for European expansion was ambiguous. The tariff-related incentives to build foreign production plants decreased. Taken alone, they would certainly have promoted the traditional preference for cross-border trade. But the harmonization policy of the Commission in Brussels also facilitated freedom of movement within the borders of the Community, especially since France and Italy – not to mention the Benelux countries – liberalized their hitherto protectionist economic policies in the early 1960s for the sake of the common European market. Within Europe, the EEC thereby became a credible candidate for major investment, and as far as Magener's profit planning was concerned, additional possibilities opened up to "create" sales and fill "gaps" in BASF's own product spectrum by means of selective acquisition. Admittedly, BASF's sales in the Common Market in the mid-1960s (23.1 percent of the company's entire turnover outside Germany) accounted for only about half its sales in Western Europe. The far more attractive outlook for the future lay in the U.S. market, where the sales volume had reached 15.6 percent and was growing rapidly.⁶⁶¹ But the North American market was difficult and held little promise of short-term returns. Precisely because of its outstanding long-term prospects, it did not lend itself well to a flexible strategy within the framework of five-year profit planning, which required one to seek the best possible return on each investment. Within BASF this incompatibility was destined more than anything else to engender conflict between the traditional cultivation of the market, which was based on a long-term entrepreneurial horizon, and the new practice of medium-term profit planning.

The question about the appropriate strategy for expansion outside Germany was tightly interwoven, too, with the second principle shaken by the turning point in corporate policy in 1963. Up to then, BASF had produced and sold few finished products that were sold directly to the consumer. The exceptions were Nitrophoska and other classical fertilizers that BASF manufactured itself and the antifreeze Glysantin. Both products had appeared on the market before World War II and for one reason or another were consistent with BASF's principle not to go into processing. In a way, the same was true of magnetic tape technology, which did not become marketable until the 1950s. These products did not put BASF in competition with its own customers but rather opened a new market subject to specific laws and hence in need of special entrepreneurial involvement and skill. The core business, however, was supposed to remain that of "conducting large-scale chemical syntheses and supplying other industries."⁶⁶² Other opportunities that kept arising were ignored on principle (through the early 1960s as well) because

⁶⁶¹ BASF annual report for 1965, p. 15.

⁶⁶² This was BASF's stated policy as formulated by Wurster at the 1958 shareholders' meeting. See Rechtsabteilung, *Fragen und Antworten*, May 30, 1958; BASF UA, C21.

“a fundamental departure from this line . . . [would] not serve the interest of the enterprise.” In 1956, for example, the managing board rejected an early offer to cooperate with the Basle pharmaceutical corporation Hoffmann-La Roche. At that time the board still felt obliged to abide by the division of labor among the successor companies of IG Farben and feared that “the development of a special pharmaceutical division would fragment BASF’s powers too much.”⁶⁶³ The only opportunities that BASF desired to exploit were those that occurred more or less by chance as by-products of its other work.

The transition to a new corporate policy deviating from BASF’s principle not to go into processing was fluid, however.⁶⁶⁴ Until the early 1960s, for example, BASF had sold styrene 475, the raw material for numerous plastics applications, only in granulated form. But it was no doubt technically and economically purposeful “to extend BASF’s production process to the manufacture of panels as a semifinished product.” Timm therefore had the managing board debate whether BASF should take this step. The only choice in his mind was between a “large-scale experiment for manufacturing panels” and the purchase of the necessary machines in the United States. For the experiment, he wanted to borrow a nozzle from a processor, Bonn-Meuser & Co., which ran plants in Krefeld, Kirchberg (near Jülich), and Völs (near Innsbruck). The firm was a chief BASF customer on the plastics market but was also completely dependent on BASF economically. This particular customer relationship triggered a fundamental debate on the question of who would sell the panels. If BASF were to handle that aspect, it would, in Schönfeld’s opinion, inevitably mean “the ruin of the Bonn-Meuser company.” If the Krefeld company were to be involved in selling them, it would be a question as to what extent the sales commission would compromise the profitability of having BASF manufacture the panels. The matter boiled down to the old axiom of not wanting to compete with your own customers. BASF thus tried to frame the purchase of Bonn-Meuser as a special case by “expressly explaining to all interested parties, especially their customers, that this takeover was only temporary and had the purpose of preserving these plants of the German plastics-processing industry.”⁶⁶⁵

By 1963, these old principles of BASF’s business policy were no longer debated in connection with important individual decisions on the extent and direction of future market integration. The fundamental decision in favor of forward integration into the area of finished goods and processing had been made. Even before that point, this change of mind had already affected other areas (tape recorders), including parts of the polyethylene business, where

⁶⁶³ Minutes of the managing board meeting of March 5, 1956; BASF RA.

⁶⁶⁴ Minutes of the managing board meeting of February 19, 1962; BASF RA.

⁶⁶⁵ *Geschichte der Rechtsabteilung der BASF. Von der Gründung bis 1967*, Part X (January 1, 1963, to December 31, 1963); BASF UA, B 101.

in August 1961 large advertisements about plastic household goods made of BASF's Lupolen were placed and the company's own Lupolen labels were introduced.⁶⁶⁶ In March 1962 Wurster considered BASF's participation in fiber manufacturing "a done deal," too, although the search for a competent partner was to be a long one.⁶⁶⁷ The massive venture into the lacquer market started in 1965 and was followed by the first steps toward the acquisition of BASF's own pharmaceutical division.

Tape Recorders I: The Struggle for the U.S. Market

Within IG Farben it was BASF that succeeded in 1934 at applying the principle of magnetic recording in large-scale technology for the first time. Magnetic tape stirred a good deal of public interest at the Berlin Wireless Exhibition in 1935. Its invention was closely allied with the development of plastic. In the Ludwigshafen plants of the 1930s, advances in plastics provided the materials and technology that rendered it possible for magnetogram mediums made of acetylcellulose (acetate) – later, of PVC and polyester foil – to replace the steel wires and paper strips hitherto used for magnetic sound recordings and to coat the tape with readily magnetizable material. The Ludwigshafen factory of IG Farben and Allgemeine Elektricitäts Gesellschaft (AEG) soon arrived at a division of labor in which AEG developed the tape recorders and BASF produced the sound mediums (the tapes). The light weight and convenience of the tapes quickly made them indispensable in computer and documentation centers, the transport sector, broadcasting stations, science, teaching, and the private sphere. In 1954 BASF differentiated itself from Hoechst by acquiring the know-how and personnel of the magnetic tape technology at Anorgana Gendorf, a former IG Farben factory. These resources, combined with those of Ludwigshafen itself, provided everything needed in order to turn the tape-recorder business into an important, independent work area of BASF.

Before long, though, the company learned how technically treacherous the new field of data-storage mediums was when polyester foil became a serious rival to Luvitherm foil, in whose expanded capacity a vast amount had been invested. The calenders, or glazing machines, that had been planned for Luvitherm foil therefore had to be depreciated as promptly as possible.⁶⁶⁸ The original intention of establishing an independent subsidiary finally became a reality 10 years later, in 1964, when BASF acquired Computron, Inc. in Waltham, Massachusetts, to produce computer tape for the American market for the first time. Until then, BASF had confined itself to the manufacture of quarter-inch reel-to-reel recording tapes for amateurs and radio. Because

⁶⁶⁶ Minutes of the managing board meeting of August 21, 1961; BASF RA.

⁶⁶⁷ Minutes of the managing board meeting of March 5, 1962; BASF RA.

⁶⁶⁸ Minutes of the managing board meeting of December 20, 1954; BASF RA.

Ludwigshafen's magnetic technology department was fully occupied with that task, construction was begun in Willstätt (near Kehl) on a new, large factory designed primarily to manufacture tapes for technical purposes. Another company founded by BASF in 1964 was Suma S.A. in Gien (the French department of Loiret), which manufactured recording tape, cut it to the appropriate length, coated it, and packed it for the French market. Although mergers of rivals such as Agfa and Gevaert or 3M and Ferrania sharpened the competition on the market for recording tape and although the expansion of capacity turned into a race against technical tapes and videotapes that did not yet exist, BASF chose not to establish formal three-way cooperation with EMI and Philips. Some of the contractual conditions called for by the potential partners were "unsatisfactory."⁶⁶⁹

Faring it alone, BASF's magnetic tape business presently caused "great concern" because complaints began to mount in the summer of 1965 and because the foreign production plants were struggling with all kinds of problems.⁶⁷⁰ The magnetophon operation was in danger of losing its strong market position. The managing board blamed the decline on a "formalistic way of working" and "the area's lack of organizational consolidation." Hoping to remedy the situation with organizational measures, it detached the magnetic technology area from the neighborhood of special products and dyes in Production Division IV and had it report directly to the new board member Willi Danz. He bore two responsibilities. First, he was in charge of the production department, which Timm had expanded into the pivot point of BASF's giant interlocking plant network (verbund) until he became chairman of the managing board in May 1965. Second, the board hoped that he could perpetuate the difficult act of keeping one foot in the business of technologically refined commodities and the other in new consumer products that ensured a sound rate of return. His solution for success was as obvious as it was risky. Where technology leadership on the market was concerned, the intention was to have BASF draw on its expertise and experience in chemistry to engage even in development and production. If pressure came from the "economic" side of the market, BASF had to help him hold its ground by purchasing the products and ideas from other companies without entailing major input of its own. BASF had laid the basis for this two-track strategy mostly through its link with chemistry through innovations in the area of magnetic tape. The prices and shares of the market that BASF could achieve for its products therefore largely depended on its solid reputation as a quality-conscious pioneer of technological progress. The strategy required BASF to offer technology leadership on the market not only for production processes (e.g., the continuous-process manufacture of magnetic oxides) but also for product innovations (e.g., the

⁶⁶⁹ Minutes of the managing board meeting of July 24, 1962, and March 2, 1964; BASF RA.

⁶⁷⁰ Minutes of the managing board meeting of August 2, 1965; BASF RA.

development of hard disks for computer systems, computer tapes, and floppy disk storage). Yet BASF simultaneously had to yield to the logic of consumer markets, which compelled all suppliers to make compromises between technical perfection and competitive mass production. Responding to the specific demands of the magnetic technology market meant, too, that the rather narrow range of products based on magnetism had to be enlarged into a product system embracing audio equipment, music products, and peripheral computer equipment. All signs pointed to intense preoccupation with selected special areas of electronics, precision engineering, and the entertainment industry – a road with stations inevitably leading far beyond chemistry.

Surprisingly, the expansion of BASF's magnetic storage technology did not initially run aground on the shoals of markets outside familiar territory. This area of the company went into a spin within its very own domains, technical competence, when it attempted to make a breakthrough in the only place it counted in the magnetic tape sector: the North American market. In the late 1960s the U.S. market for magnetic mediums constituted approximately two-thirds of the world market for such devices and was so segregated by tariff barriers and import restrictions that "development of a long-term business from Europe did not [appear] possible."⁶⁷¹ This obstacle may have been reason enough to become involved in the United States. But there was also the prospect that close contact with the developments propelled by the immense purchase power there would help seed successful business in Europe. This calculation did indeed work out at first. BASF rose to become the only European manufacturer of computer tapes capable of "competitively delivering flawless quality." In 1967, a year not untypical of development in this sector, the turnover of BASF's entire magnetic tape business grew 35 percent, with about half the amount accounted for by audiotapes and half by computer tapes. The computer tapes were purchased by all the important European consumers, including Siemens, Telefunken, Bull, Olivetti, and English Electric, as well as by the U.S. corporation National Cash Register (NCR). To expand on the American market and accelerate technology transfer, BASF took on the U.S. electrotechnical corporation General Electric (GE) as a Computron, Inc. partner and built a new factory in Bedford, Massachusetts, which began manufacturing all types of magnetic tape in 1967.

This momentum only intensified the shock experienced by BASF's top management when GE made it known in early 1968 that it was ending its 50 percent stake in the company. The reasons given by the head of the GE's chemical division hit especially hard: little confidence in BASF's technology in general and substandard quality of the Computron, Inc. tapes in specific.⁶⁷² BASF rejected these reproaches out of hand and considered the quality of tapes by Computron, Inc. absolutely comparable to that of their American

⁶⁷¹ Minutes of an extraordinary meeting of the managing board of March 8, 1968; BASF RA.

⁶⁷² *Ibid.*

competitors, IBM and Memorex. But BASF did have to admit that its tapes met only 40 of the 65 possible electroacoustical and mechanical quality conditions, that their abrasion resistance in particular still had to be improved, and that they did not yet pass an environmental test necessary for the U.S. market. Moreover, the BASF computer tape had "again failed a retest for inclusion in the qualified products list," meaning that the sales forecast had to be halved.⁶⁷³

Nevertheless, GE's disinterest in Computron, Inc. was blamed on economic, not technological, matters. Because the price of computer tapes had plummeted, the new factory of Computron, Inc. in Bedford would have had to produce 480,000 units just to reach the break-even point. Only a doubling of capacity under otherwise favorable sales conditions would bring in sufficient profit. Still worse, commencement of computer-tape production by the leader in the field of data processing, IBM, depressed the average net price from \$19 to between \$15 and \$18, making it extremely difficult for Computron, Inc. to continue operating all on its own. The loss forecast for 1968 had meanwhile doubled to \$2.7 million. Already practically without liquid assets, the American subsidiary had gone months without paying BASF for deliveries.

Whereas the hectic restructuring of the sector and the dim outlook for short-term profits moved GE to terminate its cooperation, BASF's interest in Computron, Inc. had a long-term perspective on precisely this issue. "It is expected that the worldwide sales of the BASF Group can triple by 1970 if our research can keep abreast of the dynamic and headlong development taking place. In this context Computron, Inc. must be regarded as the most immediate and essential link to the U.S. market."⁶⁷⁴ Timm therefore considered the survival of Computron, Inc. "imperative." Magener, too, stressed "the pressure to maintain the U.S. bridgehead, Computron, Inc., in the interest of the entire magnetic tape business." Freiensehner had previously assured the head of finance that the returns on the magnetic tape business transacted exclusively through Ludwigshafen lay within the BASF average and that the price erosion in the United States was unlikely to have an effect in Europe for a few years. Danz seconded, stating that 90 percent of BASF's business volume in the area of magnetic tapes was accounted for by products newly developed within the last two years. As the head of that line of business, he argued for taking the bull by the horns. Computron, Inc., he stated, should run the computer-tape factory at optimal capacity, should at last itself manufacture the new computer storage medium, the disk pack (a rigid, circular plate coated with permanent magnetic material as a hard disk), and should begin including home tape recorders and cassettes in its product line. The additional funds necessary no longer had to be covered by loans; they were

⁶⁷³ Minutes of the managing board meeting of April 4, 1968; BASF RA.

⁶⁷⁴ Minutes of an extraordinary meeting of the managing board of March 8, 1968; BASF RA.

flowing directly from the Ludwigshafen budget. After BASF redeemed GE's shares, the first thing was to restore a "fighting spirit," to invest the new management with "genuine executive responsibility," and to lead the subsidiary "consciously as an American company" to ensure "that the stimulus coming from the U.S. market is registered and responded to in time."⁶⁷⁵ To claim the foreseeable losses against taxable income, the managing board envisaged amalgamating BSI with BASF Corporation. Though delayed until 1972, the move did take place for precisely that reason under the aegis of BASF Wyandotte.⁶⁷⁶

The good intentions formulated in 1968 had only a fleeting effect. The American subsidiary, renamed BASF Systems, Inc. (BSI), did manage to triple its turnover in 1969 by broadening its range of products, and seemingly moved into the black in early 1970. In the same year, it even placed BASF brand-name tape recorders on the American consumer market. At the same time, though, confidence in the American venture's long-term prospects for success nose-dived. Against better knowledge, the managing board in Ludwigshafen started persuading itself "that BASF Systems, Inc. is no longer necessary for our maintenance of contact with the American electrical industry and further cultivation of the American market." Faced with the financial crisis of BASF AG and BSI's lack of profitability, the board decided to look into selling BSI, albeit without success.⁶⁷⁷ In 1970 the trend in BSI's earnings reached the neuralgic point beyond which even the long-term "German" developmental strategy of speculating on future shares of the market could not cope. According to an ironclad rule of BASF finance policy, all patience with weakly performing areas of the company ended where cash losses started. BSI crossed this red line in 1970; by the time of the amalgamation with BASF Wyandotte, DM 19 million in such losses had accumulated.⁶⁷⁸

The new management put in by Ludwigshafen was not able to turn the company around either,⁶⁷⁹ but it did elucidate matters. BSI now had to put all its cards on the table, and its disclosure was anything but reassuring. Beyond the 1971 losses, which had plunged the company into the "state of total insolvency," it would not be possible to generate any positive cash flow from 1972 through 1974. Mercilessly calling a spade a spade, the diagnosis revealed that the company "in its products" was "technically inferior" to the competition and thus suffered all the more from "the catastrophic market development," which had undermined prices so much that even renowned

⁶⁷⁵ Henkel to the members of the managing board, "betr. Vorschlag zur Weiterführung von Computron." May 2, 1968, attachment 8 to 16/68; BASF RA, minutes of the managing board.

⁶⁷⁶ Minutes of the managing board meeting of August 1, 1972; BASF RA.

⁶⁷⁷ Minutes of the managing board meeting of November 9, 1970; BASF RA.

⁶⁷⁸ "Finanzwirtschaftliche Darstellung von Verlustquellen in der BASF-Gruppe," attachment 2 to 28/72; BASF RA, minutes of the managing board.

⁶⁷⁹ Minutes of the managing board meeting of July 19, 1971; BASF RA.

rivals such as Radio Corporation of America (RCA) had had to withdraw. Compounding these problems were the management mistakes by BSI's president – a former production director for whom the position as the American head of the entire enterprise had proven too much – and “embezzlement by individual employees.”⁶⁸⁰

The question of “the responsibility for the catastrophe” had to remain open, though, because Timm preferred to assume that it represented “primarily” a one-off case rather than “structural weaknesses of the BASF Group.” On a visit to the United States in November 1971, he personally formed a judgment about “the catastrophic circumstances at this company” and had come to the conclusion that “the corporate management had failed all the way down the line.”⁶⁸¹ The managing board in Ludwigshafen blamed the “collapse and cash loss” at BSI on the boom and hectic rat race in the American computer industry, “where it is nearly impossible to find suitable personnel.” The liquidation of the U.S. subsidiary and the looming closure of the Bedford works – along with the associated loss of DM 40 million – were barely averted.⁶⁸² The once proud company that had spearheaded BASF's magnetic storage technology survived practically only as a memory, its former image henceforth able to inspire only modest confidence among computer customers. Before long, however, Ludwigshafen's magnetic technology division judged that BSD, as Systems was henceforth called as a department of BASF Wyandotte, was not able to perform this service either. The company “tried to avoid genuine competition by undercutting prices, had to struggle too much with internal shortcomings, and had no resources for publicity that was adequate or even comparable to that of others.”⁶⁸³

The founding of BASF Systems Corporation (BSC) in 1981 marked BASF's bid for a comeback on the U.S. market, which was still “crucial to the industry,” and a final attempt to have an impact on its development. At that time BASF was the only manufacturer capable of supplying a complete range of tapes and cassettes for all video systems, and it greatly expanded these production capacities in Willstätt and Bedford. The upswing in the computer sector of the early 1980s also helped BASF's return because it boosted sales of the classical magnetic storage mediums for electronic data processing. But BSC ultimately hit the limit of its competitiveness on this market in 1981. The integral-disk business that BASF had so belatedly entered eventually failed, and BSC Los Gatos, California, the factory specialized in making the disks, had to be abandoned. Profit under such conditions was unthinkable. The earnings from classical magnetic mediums were more than offset by the

⁶⁸⁰ Minutes of the managing board meeting of December 23, 1971; BASF RA.

⁶⁸¹ Minutes of the managing board meeting of November 22, 1971; BASF RA.

⁶⁸² Minutes of the managing board meeting of November 2, 1971; BASF RA.

⁶⁸³ Dr. H. Thurn (head of the magnetic technology division), *Die Bedeutung des US-Marktes und von BSD für das M+N-Geschäft*, January 1975, attachment 2 to 3/75; BASF RA, minutes of the managing board.

costs of developing the market for video products. Among the American subsidiaries, whose performance was not exactly strong, BSC became the main source of red ink, with losses that had steadily mounted from \$5.7 to 26.3 million by the time it was reabsorbed by its now larger U.S. counterpart, BASF Corporation.⁶⁸⁴ The end of BASF's second attempt to show its flag on the trendy U.S. market appeared as early as 1983. BSC did expand its business but not at satisfying prices in the tough competition on the market for information systems. It had to give up on manufacturing magnetic disk cassettes and 14-inch disk packs and handed its affiliated West German factories the task of supplying the North American market. The manufacture of magnetic tape, too, finally ended in Bedford in 1992, the same year in which it had to be terminated at the French factory in Gien as well.

Tape Recorders II: The "National Champion" on the Defensive

The turbulence that had repeatedly sent BASF's subsidiaries into tailspins on the American pilot market since 1968 was carefully observed in Ludwigshafen and just as often cushioned at the last minute, but for a long time it did not seem to filter through to the European market. The tape-recorder and computer-tape business in Europe developed much better than hoped. In 1967 turnover exceeded the DM 100 million level, rising by 16 percent in both areas.⁶⁸⁵ The pace of expansion quickened accordingly, notably within Germany, where the rates of increase surpassed 20 percent and even hit 29 percent in early 1969.⁶⁸⁶ Compact cassettes and other innovations in the audio business were successfully marketed. Exports advanced less well because dependence on the major audio corporations, including Philips, led to wide sales fluctuations. On the domestic market the reputation as a quality producer stood BASF in good stead. To beat out rivals such as Agfa, whose status was just as strong but confined to audio products, BASF introduced innovations in the computer area.

With all this activity, it was tempting not to take the American market all too seriously as long as sales and earnings at home were in order. Of course, that attitude contradicted BASF's own knowledge that strategic decisions were made solely on the American magnetic technology markets. "If you want to be present in the computer area outside the United States not just as a follower but as a successful business, you have to prove that your products are recognized in the United States, too."⁶⁸⁷ This insight was especially pertinent inasmuch as BASF had been forewarned since 1967 that

⁶⁸⁴ BASF annual reports for 1981 through 1984, *passim*.

⁶⁸⁵ "Umsatzbericht des Verkaufs 1967" [Annual sales report for 1967], attachment 1 to 1/68; BASF RA, minutes of the managing board.

⁶⁸⁶ "Zur Geschäftslage," attachment 4 to 8/69; BASF RA, minutes of the managing board.

⁶⁸⁷ Dr. H. Thurn, *Die Bedeutung des US-Marktes und von BSD für das M+N-Geschäft*, January 1975, attachment 2 to 3/75; BASF RA, minutes of the managing board.

competition would intensify. In May of that year it became known that the U.S. market leader, IBM, wanted to begin production of computer tapes in West Germany. Freiensehner, BASF's head of sales, was aware that "the realization of this plan . . . [would] mean serious damage to BASF" and wanted "to try everything to deter IBM – to whom we pay DM 11.5 million a year in rent."⁶⁸⁸ However, the means of dissuasion he evidently wanted to use were ill-suited to impressing this powerful opponent. BASF simply could not match its competitor's quality standards. In December 1968 the sales department complained: "Because of the unnecessary quality standards, we are, unfortunately, not yet back in business with Philips and Grundig. The disk packs, too, have been avoided by our biggest customers for three months (loss of DM 1 million per month) because of wholly exaggerated and excessive demands on quality."⁶⁸⁹ BASF compensated in the audio- and videotape business, where the company did in fact have more sales possibilities than it could pursue.⁶⁹⁰ Delivery bottlenecks occasionally occurred even with computer tapes in the fall of 1969. Despite all the dynamics of growth in the magnetic tape sector, the magnetic technology group contributed only 3 percent of the value created by BASF AG in 1969, whereas the agricultural division still accounted for 37 percent.⁶⁹¹

In terms of direct contact with the consumer, BASF's range of products did comparatively well, as seemed to be apparent from the public's response to the radio and television exhibitions. "The comparison between Bayer's booth and BASF's and the attention they received from customers and visitors must have been devastating for Bayer."⁶⁹² Unlike BASF, Agfa supplied only reel-to-reel tape recorders, compact cassettes, and magnetic film and was thus operating only in the audio sector, just as when it had opened for business after the war. It had no computer tapes or magnetic disk packs and no audio appliances in its product line. The Bayer subsidiary was therefore much more susceptible to a phenomenon already painfully familiar to BASF from its U.S. experience: the cassette market's segmentation into private-label and high-quality products. In the early 1970s private labels accounted for half of this sector's total turnover in Europe, a situation similar to that in the United States.⁶⁹³ BASF could not openly participate in this market, for

⁶⁸⁸ Minutes of the managing board meeting of May 16, 1967; BASF RA.

⁶⁸⁹ Bericht des Verkaufs über den November 1968 [Sales report for November 1968], attachment 8 to 39/68; BASF RA, minutes of the managing board.

⁶⁹⁰ "Zur Geschäftslage," attachment 5 to 25/69 (September 9, 1969); BASF RA, minutes of the managing board.

⁶⁹¹ McKinsey, First Intermediate Report – Discussion with BASF's Vorstand, January 13, 1969, UAM, BAS 01 690113 II.

⁶⁹² "Zur Geschäftslage," attachment 5 to 25/69 (September 9, 1969); BASF RA, minutes of the managing board.

⁶⁹³ Thurn, M+N (magnetic technology and nylon printing plates) Division to Dr. Freiensehner, director, "betr. Teilnahme der BASF am Geschäft mit Private Label Cassetten," Ludwigshafen, March 7, 1973, attachment 5 to 6/73; BASF FA, minutes of managing board.

the pricing of its "quality products" would have begun to slip. On the other hand, it seemed quite impossible for the company to ignore the market for private-label cassettes without sooner or later losing its leading position on the overall market. Working through an intermediary in 1973, BASF therefore founded a sales company in which the Berlin company Permaton, a 100 percent purchaser of BASF's blank tapes, had a stake. Cost structure and a favorable site in Berlin then enabled Permaton to manufacture private-label cassettes at acceptable market prices. BASF thereby gained a degree of influence and a share of the turnover and earnings on the market for low-price cassettes, but what had been its core business until then was consequently "limited to an uninteresting level of turnover and its profitability jeopardized."⁶⁹⁴

Unlike Agfa, BASF possessed the technical resources to distinguish itself from the low-price competition. Relying on its established expertise in developing new magnetic pigments and coating technologies, the company set new technical standards when it introduced compact cassettes fabricated with chromium dioxide and ferrochromium. On the European market, BASF was successful with videotapes and videocassettes through 1980, after which point it had to leave increasingly large shares of the market to its cheaper Japanese competition. The manufacture of compact cassettes meanwhile cost 10 to 25 percent more in Willstätt than at BASF's own foreign sites of the magnetic tape division.⁶⁹⁵ The rearguard action in Europe was preceded by defeat on the U.S. market. Similarly unfruitful were the attempts to make further inroads into the music and hi-fi business so as to offer complete product systems. In March 1971 BASF began to produce and sell music cassettes and records to secure its tape-recorder business,⁶⁹⁶ and within three years it was offering more than 1,700 titles. The star line of the BASF label extended from Beethoven pianist Friedrich Gulda to songwriter Knut Kiesewetter and from star pop artists such as Cindy & Bert to the rock group Karthago. However, the highly publicized foray into the music and show industry had to be ended without a word in late 1976 "because the results lagged considerably behind the original expectations and no sustained improvement was anticipated."⁶⁹⁷

BASF's own production of audio appliances and video recorders did not start up much differently, either. Since 1971 the company had purchased high numbers of cassette recorders from the Sony subsidiary AIWA, Nippon Electric Corp. (NEC), JVC, and other known manufacturers of appliances, marketing the equipment as hi-fi stereo tape decks under the BASF label. This practice gave rise to the first large plastic casings made with BASF tools and

⁶⁹⁴ Dr. H. Thurn, *Der zukünftige Weg der Sparte M+N*, January 1975, attachment 1 to 3/75, BASF RA, minutes of the managing board.

⁶⁹⁵ Dr. H. Thurn, *Referat Behördentag Willstätt*, May 3, 1979, Privatarchiv F. Engel, The author is grateful to Mr. Engel for this information and other facts.

⁶⁹⁶ BASF annual report for 1971, p. 48. ⁶⁹⁷ BASF annual report for 1976, p. 19.

know-how.⁶⁹⁸ One of these recorders was combined with a radio, whereas the others remained purely control units intended as components compatible with any high-quality hi-fi system. Lastly, BASF also offered hi-fi components by partner companies such as Lenco (record players) and Canton (loudspeakers) under its name, making it possible in 1975 to assemble a complete hi-fi stereo system from "BASF" components. To put this business on its own feet, the magnetic technology division considered a "pure production joint venture with a strong appliance company" that would set up joint manufacturing in Obenheim, Alsace. The advantage for both parties was obvious. BASF knew the profit margin was larger "if one not only trades but produces."⁶⁹⁹ For the desired partner, AIWA, the EEC's import restrictions on Japanese electrical appliances could be "overcome only if we add at least 45 percent of the value of the goods through our own production outside Japan." If the joint venture with AIWA did not come about, BASF intended to assemble cassette recorders in Willstätt from components – "semiknockdowns" – purchased partly in Japan and partly in Europe.

BASF's magnetic tape division ventured even deeper into unknown territory with the development of a system for video recording on magnetic tape. The know-how in this field at BASF was second to none, so the managing board wanted to continue both developing and producing the equipment. The video camera was the only piece for which "collaboration with suitable worldwide firms" was sought. By this time, IBM completely dominated the technological development of computer-related products, clearly marking the path that all competitors had to follow. BASF therefore tried to keep up with the unchallenged market leader at an appropriate distance in computer tape and magnetic disk packs – the hard disk – as well as in IBM-compatible peripherals. It was a DM 48 billion market that was growing 15 to 17 percent a year, and BASF wanted to be a strong part of it.⁷⁰⁰ By targeting selected specialized areas of electronics and precision engineering, Ludwigshafen also ambitiously aimed to sell DM 110 million of IBM-independent equipment annually by 1978, a figure totaling 60 percent of BASF's total sales volume in computer equipment. With magnetic technology and nylon printing plates, which were combined into an M+N area, total turnover was likely to exceed a billion marks by that time.

The second major setback in the business with magnetic technology followed just a few months after these high-flying plans. Competing inexpensive products from low-wage countries put prices under pressure and quickly undercut sales of compact cassettes. BASF had to resort to short-time work to adapt production to the market situation, and planning had to be revised to reflect the new facts. Although business picked up again in the second

⁶⁹⁸ Information from Dr. Wolfgang Martiny, formerly from BASF Magnetics.

⁶⁹⁹ Dr. H. Thurn, *Der zukünftige Weg der Sparte M+N*, January 1975, attachment 1 to 3/75, BASF RA, minutes of the managing board. ⁷⁰⁰ *Ibid.*

half of the 1970s, the company could not establish itself on the hotly contested market for hi-fi equipment. The manufacturing of hi-fis never got off the ground. The sale of audio appliances made in Japan was ended in 1980 because almost all partners in the second half of the 1970s had built their own sales and service organizations in Europe, many of them headquartered in Germany. In 1979 the development of a second generation of color video recording and playback systems also failed against the superiority of competitors, particularly Japanese manufacturers.⁷⁰¹ The standard developed by BASF, longitudinal video recording (LVR), was no match for their video home system (VHS). The German system, with a magnetic tape head offering a 72-unit frequency range control, was technologically more robust and more sophisticated than VHS, which records by passing magnetic tape around a drum in the form of a helix. LVR would have made it possible for the first time to achieve hi-fi-quality sound recording and simple servicing. But the BASF technicians and engineers were unable to compensate for a crucial disadvantage of the system: a 100-millisecond loss of picture and sound when the magnetic tape changed direction and switched over to the next track. In 1978 Blaupunkt GmbH, a subsidiary of the Bosch Corporation, pulled out of the joint development work; the "practical market introduction" of the LVR system announced for "mid-1980 at the earliest" never occurred.⁷⁰² BASF systems had to give up its new, nearly completed factory in Fountain Valley, California, which had been scheduled to produce 100,000 LVR machines a year.⁷⁰³

This reversal forced BASF to focus on manufacturing videocassettes. The company complemented its two existing production plants, Willstätt and Bedford, with a third one located in the German town of Ettenheim in Southern Baden. The development of magnetic storage mediums for electronic data processing was similarly fickle. Again, the most aspiring project, the integral disk, failed, whereas all the IBM-compatible peripherals held ground against market rivals, including the Japanese competition that was on the rise in the early 1980s. The tough price war weighed on the results, however, though the construction of highly automated production lines in the Ettenheim factory substantially lowered the manufacturing costs. With prices under heavy pressure from the Far East in the mid-1980s, BASF's magnetic storage business ultimately entered a decade of consolidation, restructuring, and streamlining that eventually led to disengagement from that market. The company's compatible computer systems went to Comparex

⁷⁰¹ BASF annual report for 1979, p. 21. "Videorecorder heute und morgen: LVR tritt auf dem Videomarkt an," BASF press information, August 1979.

⁷⁰² "Neues von der BASF auf der Funkausstellung in Berlin," in *BASF Orientierung. Material für das Mitarbeitergespräch*, August 23, 1979.

⁷⁰³ "Investitionsplan der BASF für 1979," in *BASF Orientierung. Material für das Mitarbeitergespräch*, February 9, 1979; BASF annual report for 1979, p. 21.

Informationssysteme GmbH, a Mannheim company founded with Siemens in 1987.

Comparex alone survived the end of Ludwigshafen's magnetic storage technology. In early 1989, BASF Corporation consolidated the rest of the parent company's U.S. magnetic storage business in a joint company founded with Fuji Photo Film USA, Inc. – B & F Microdisks, which focused solely on manufacturing 3 1/2-inch diskettes. Production of magnetic hard disks in Willstätt was ended because it stood no chance against the competition from the United States and Eastern Asia. In 1991 BASF took over the magnetic tape activities of its old competitor Agfa-Gevaert AG, with which it had co-operated since 1987, along with its sites in Munich, Berlin, and Avranches (France), but the transaction did nothing to improve BASF's position. On the contrary, the Agfa label largely collapsed on the market, triggering another round of personnel cutbacks in Munich, Ettenheim, and Willstätt. Persistent overcapacity and losses left no choice but to close the sites in Bedford, Gien, and Ettenheim. Three years later BASF shareholders were still hearing the same message: "The course of restructuring and streamlining was resolutely continued."⁷⁰⁴ This refrain sounded until the very end, 1996, when the magnetic tape division of BASF, steeped as it was in tradition, ceased to exist.

The remaining production of audio- and videocassettes, sound and image mediums, diskettes, computer tapes, and computer-tape cassettes was managed by BASF Magnetics GmbH until 1997. With sales of DM 1.5 billion and equity capital of DM 400 million, it was still the world's largest coater of magnetic tape. But for the two years of 1991 and 1992 alone, the losses amounted to DM 582.4 million – nearly equaling the after-tax profit of the entire BASF Group in 1992.⁷⁰⁵ The information systems operating division, the last manager of all the company's transactions, was dissolved in mid-1996, with 40 percent of Comparex being sold to the German holding company of the South African information technology corporation Persetel. A further 35 percent followed in 1998. BASF Magnetics was placed under the direct control of the BASF managing board and in 1997 was sold with its worldwide magnetic tape business and its sites in Ludwigshafen, Willstätt, Munich, Obenheim, Avranches, Jakarta, and Manaus to the Korean corporate group Kohap. Named Emtec and still running under the BASF label until 2001, the successor company of BASF Magnetics turned a profit in the years thereafter, albeit with a workforce one-third its original size and with five times its former output.

⁷⁰⁴ BASF annual report for 1995, p. 26.

⁷⁰⁵ BASF annual report for 1991, p. 38; BASF annual report for 1992, pp. 38 and 41; see also "Demo gegen Verkauf: Magnetics-Mitarbeiter protestieren/Aufsichtsrat entscheidet," in *BASF information*, September 19, 1996.

Basically, the fate of BASF magnetic technology had already been decided in the years from 1968 through 1970, when it had not been possible to cushion the blow of General Electric's withdrawal from Computron, Inc. and to turn the situation around productively. Although the managing board knew very well that the U.S. market would be the acid test of innovative involvement and long-term success in a lucrative sector, it failed to treat the crisis of Computron, Inc. with the alertness and decisiveness due a major objective. BASF magnetic storage technology lacked neither the technical competence nor the technological substance required for leadership on the consumer goods markets of the ascendant sector related to them. However, it had no additional wherewithal for successful forward integration into markets governed by laws outside the chemicals market: the will to adapt to alien entrepreneurial rules of the game, a willingness to take risks and commit large amounts of capital, and personnel who knew the territory. Having only 611 employees and \$3 million in capital in 1970 – even after expansion into BASF Systems, Inc. – Computron, Inc. did not have the weight that a pioneering enterprise requires for new entrepreneurial combinations on an unusual, difficult growth market. Given the parent corporation's precarious finances, which called for caution with each fresh expansion, the managing board preferred a defensive strategy that also had to allow for the weaknesses of the U.S. subsidiary's personnel, among other things. The market for information technology, whether for entertainment or data processing, placed special demands on entrepreneurship. The extreme volatility of both supply and demand put a premium on critical business judgment. The high frequency of new and unforeseeable developments confronted the management with tasks that defied exclusively routine approaches, and not just in the technical sense.⁷⁰⁶

In a booming industry with an exceptionally tight market for managers, it would certainly have been difficult to find the urgently needed "key experts" prepared to tie their careers to the uncertain success of a foreign newcomer and challenger, but BASF did not even try to look. In the crisis of 1970, the technically oriented American management was followed by personnel from Ludwigshafen who had the managing board's trust but who knew little of the American market. By integrating Computron, Inc. into the chemical manufacturer BASF Wyandotte, which was still enduring its own phase of consolidation, BASF's all but abandoned its attempt to become a global player in information technology. Without a presence on the North American lead market, the magnetic technology division was eventually forced onto the defensive. Perhaps not coincidentally, it shared this outcome with the national champions of the German hi-fi market, particularly Grundig, which were unable to shed their provinciality. The field of electronic data processing

⁷⁰⁶ See Casson, *Unternehmer*, p. 537.

suffered a similar end. Siemens and other global players in German electronic engineering long struggled to catch up with the world market in the highly innovative computer sector. Given that fact, becoming a leader there was bound to be even more difficult for a fully integrated production division of a chemical corporation, which had to step beyond its own, very different corporate culture and market rules.

Lacquer: Defensive Forward Integration

Forward integration into the market of lacquers was no doubt a much more obvious strategy for BASF's core business than leadership in information technology was. Nevertheless, this involvement sprang less from the company's own initiative than from the move to parry American expansionist designs on the German market. BASF could not allow Glasurit-Werke M. Winkelmann AG, Hamburg, "the Federal Republic's largest lacquer manufacturer and BASF's largest lacquer customer, to fall into foreign hands."⁷⁰⁷ But that outcome was precisely what seemed imminent in June 1965 when the U.S. chemical corporation W.R. Grace & Co. went seeking acquisitions in Germany and, advised by Otto Ambros, chose Glasurit as its target. From the outset, BASF not only realized it stood to lose an important customer; it knew that working closely with a lacquer factory could greatly benefit BASF research.

Soon after the first hopeful contacts, however, price negotiations with Glasurit snagged. The owners of the family stock corporation, which had been founded in 1888, bargained hard, knowing full well that they could play two powerful bidders against each other.⁷⁰⁸ They asked no less than 800 to 1,000 percent as a takeover price for their shares, whereas BASF had first offered a one-to-one exchange, that is, a market price of 460 percent. Although the managing board in Ludwigshafen felt that exceeding this exchange ratio by any amount was problematic for BASF's image, it was ultimately prepared to accept a takeover price of 750 percent, which would have corresponded to a sum of approximately DM 200 million. The acquisition still seemed worth it at that price. With a dividend rate of 20 percent on BASF's own shares and a dividend payout ratio of 2:1, BASF would yield a return of DM 8.8 million and a retained profit of DM 4.4 million (i.e., DM 13.2 million total) against Glasurit's estimated return of DM 15 to 16 million. Still, a "cooling-off phase" was desired during which the operation was to be examined closely by representatives from production, distribution, research, and engineering so as to improve assessment of the ability to sustain future earnings. Equally important, the managing board wanted to gain time to shift the transaction into the next year for tax reasons. In any

⁷⁰⁷ Minutes of the managing board meeting of June 19, 1965; BASF RA.

⁷⁰⁸ Minutes of the managing board meeting of August 16, 1965; BASF RA.

case, the entire issue had become so serious that it was decided to inform the chairman of the supervisory board.

The Glasurit affair gave occasion to discuss "the general line" of business policy in the lacquer area before the takeover took place.⁷⁰⁹ The goal was, "if possible, to prevent one of the three other major lacquer companies (Wiederhold, Herberts, and Herbig-Haarhaus) from surrendering its independence and being taken over by either an American or German chemical company." The stated first priority was to come to an arrangement with Wiederhold; second priority, to arrive at "some kind of agreement" with Herberts to ward off the feared development. In both cases it was a matter of obtaining a right of first refusal but, incidentally, also of refusing to take over smaller lacquer companies. BASF still shunned violation of its old principle of not buying up customers. The German lacquer industry had a strict division of labor according to which the chemical corporations only manufactured raw materials for lacquers and provided them to the more than 100 small and medium-sized plants that mixed them into finished lacquers. Things seemed to be different with Glasurit, the industry leader. In this case, BASF could even credit itself with protecting the German lacquer industry from foreign control. The 14 shareholders of Glasurit AG adopted this interpretation and finally sold to BASF, although Grace – as Ludwigshafen knew – was far advanced in its negotiations and was willing to pay DM 300 million, part in cash and part in shares.⁷¹⁰ When Texaco arrived on the scene as an additional bidder, BASF hiked its offer to DM 248.5 million and at last closed the deal.

This outcome blocked a further maneuver to protect the German lacquer industry against takeover by major domestic and foreign chemical companies. The Wuppertal lacquer industrialist Kurt Herberts, the sole proprietor of Dr. Kurt Herberts & Co. Chemical Works and, with the brand trademark Glemadur, hitherto number two in the sector, suggested that Glasurit be bought up and operated jointly by all interested West German chemical companies. Not unjustifiably, Herberts was concerned that BASF and other corporations could soon control the market by integrating all its levels.⁷¹¹ The initiative was impractical and came too late, however. In 1965 Glasurit was integrated into the BASF Group as an affiliated company. Ludwigshafen appointed the supervisory board, delegated a representative to the managing board in Hamburg, and had all lacquer interests be coordinated by the responsible sales director, Hans Oesterlin.⁷¹² Corporate funds went to augment Glasurit's share capital from DM 27 to 48 million, and the dividends

⁷⁰⁹ Minutes of the managing board meeting of November 16, 1965; BASF RA.

⁷¹⁰ Minutes of the managing board meeting of October 6, 1965; BASF RA.

⁷¹¹ "Glasurit-Verkauf: Nur an Deutsche," *Der Spiegel*, November 8, 1965.

⁷¹² Heintzeler to the members of the managing board, Ludwigshafen, February 23, 1966, attachment 6/66; BASF RA; minutes of the managing board.

were adapted to the practice in Ludwigshafen. BASF paid part of the purchase price in cash (DM 28 million), part with its own shares at a nominal value of DM 48 million at a price of 458 percent. For this purpose the company drew DM 48 million from authorized capital to build up its capital stock to DM 1,148,000,000. Together with the German parent company, BASF also took over the lacquer company's foreign holdings: Glasurit (G.B.) Ltd. in Slough, England (100 percent), and Glasurit Italiana S.R.L. in Rome (80 percent). BASF was probably not the only one to see this undertaking as "the largest such transaction in the postwar period of the Federal Republic of Germany."⁷¹³

BASF had scarcely settled its first acquisition of a lacquer company before there was a new opportunity to supplement its share of the market. Robert Ellscheid, who represented a group of owners of Herbol-Werke Herwig-Haarhaus, inquired in Ludwigshafen whether BASF was interested in purchasing the Cologne company, too. It was the third largest lacquer factory, ranking behind Glasurit and Herberts, and also seemed to be thinking of giving up its independence, as was a smaller enterprise, Bonaval-Werk GmbH in Bonn. Like a row of dominoes, the West German lacquer industry started to tip, forcing BASF and other interested companies to act. Although Grace was among the competitors in this case as well, BASF did not want to do someone else's dirty work so soon after its tour de force with Glasurit. Unlike Glasurit, whose production program was oriented to industrial lacquers, Herbol specialized in paint coatings, so BASF did not have to expect to lose sales "if Grace should be the acquirer."⁷¹⁴ After failing in an attempt to team up with Herberts as an acquirer, Timm told Ellscheid "that BASF did not see itself in the position to submit a bid for Herwig-Haarhaus." Herberts, whom Texaco and Grace were pressuring to sell his enterprise, wanted to take over Bonaval, too, only if BASF gave him financial help. The reluctance of the managing board in Ludwigshafen resulted partly from the fact that the acquisition of the Glasurit factories had in practice fallen far short of what it had promised to be. In late 1966 BASF even had to consider whether to claim right of recourse as provided for in the Glasurit acquisition agreement because the internal audit had raised serious objections that culminated in the statement: "The transaction was therefore undeniably based on an inflated capitalized value."⁷¹⁵ In the end, no claims were made against the supervisory board chairman and the entire managing board of the old Glasurit. The simple fact was that no damage could be proved, for "in BASF's race with the indisputably present American competitors, knowledge of the points being objected to would have had no effect on the setting of the purchase price."

⁷¹³ Dr. Kraft, article for *Geschichte der Rechtsabteilung der BASF. Von der Gründung bis 1967* (April 6, 1966); BASF UA, B 101.

⁷¹⁴ Minutes of the managing board meeting of April 4, 1966; BASF RA.

⁷¹⁵ Minutes of the managing board meeting of December 12, 1966; BASF RA.

However, the decision also turned on the fact that the affected members of the Glasurit Group were now one of the largest individual shareholders of BASF, and antagonizing them would have meant major trouble. For the first time since re-establishment, BASF had to show regard for the power of individual shareholder groups when making a key decision. It was the price the company had to pay for its preferred method of financing – the share exchange. More important, however, above all in view of the pressure from domestic and foreign competitors, was the lesson that one could predict the effect that an acquisition was going to have on turnover but could not know what an acquisition would contribute to profits.

Nonetheless, negotiations for acquiring Herbol reopened in 1966, though the rigid negotiating position on buying that company caused the talks to collapse at the end of the year. In the same year Ludwigshafen's solicitors also trained their sights on Dr. Beck & Co. AG, a Hamburg enterprise specialized in insulating lacquers and synthetic resins for the electrical industry. With DM 3 million in share capital, the company was small, but it was solid and had subsidiaries in India, England, and Italy. After assessing the likely profit to be had by acquiring Dr. Beck & Co., Magener limited the purchase price to DM 5.5 million in BASF shares.⁷¹⁶ Beyond one million marks in cash, the family owners received a nominal DM 5 million in BASF shares, which Deutsche Bank initially lent from its portfolio and recouped from authorized capital at the next capital increase. The question soon arose again whether it was in BASF's interest "to forge a close link to the Herwig-Haarhaus lacquer firm."⁷¹⁷ The specter of the American danger resurfaced on the horizon because Grace tried once more to gain a foothold in the German lacquer market. The ailing enterprise wanted more and more to distinguish itself as the leader of resistance to BASF's penetration of the sector. The "gentlemen of Herwig-Haarhaus" let it be "unmistakably" known "that their firm will no longer buy a single gram from BASF if BASF or Glasurit goes into disperse dye" and thereby invades a domain of the Cologne company.⁷¹⁸ Moreover, it would "not go without protest if BASF incorporates any more lacquer firms." Just under a year later, Herbol itself fell victim to BASF's lacquer empire. After a "sometimes dramatic turn of events," BASF finally acquired around 48 percent of the Cologne company's share capital at a price of 700 percent, with the Bayer paint factories simultaneously taking over 26 percent of the share capital at the same price from a different line of the Herwig family.⁷¹⁹ At this time BASF already held somewhat more than 25 percent of Herbol in another intercorporate participation, so that it finally managed to control a total of 72 percent of Herbol AG. Although a 75 percent stake

⁷¹⁶ Minutes of the managing board meeting of August 7, 1967; BASF RA.

⁷¹⁷ Minutes of the managing board meeting of May 16, 1968; BASF RA.

⁷¹⁸ Minutes of the managing board meeting of November 6, 1967; BASF RA.

⁷¹⁹ Minutes of the managing board meeting of December 9, 1968; BASF RA.

would have been necessary to control the new subsidiary, complete technical integration with Glasurit and Dr. Beck could already be pursued to exploit the potential for rationalization – long before Bayer ceded its intercorporate participation in Herbol to BASF during the second breakup of IG Farben in late 1969.

By combining Glasurit and Dr. Beck with Herbol, the BASF Group achieved an annual turnover of DM 380 million in 1968, making it Europe's strongest supplier of lacquer. Except for a few highly specialized areas, these three companies offered a comprehensive range of products: industrial lacquers from Glasurit, paints from Herbol, and electrical insulation lacquers from Dr. Beck. There was no longer cause to acquire other lacquer firms within Germany. Any perpetuation of expansion would have been interpreted by BASF's small and medium-sized customers as a “power play” and would have harmed business in raw materials for lacquers, which accounted for DM 82 million in 1968, including sales outside BASF's own lacquer group.⁷²⁰ Efforts centered instead on widening the company's share of the domestic market, which was 15 percent, and on activities abroad.⁷²¹ With the EEC not exactly encouraging companies to cross borders, vast improvements in efficiency were expected particularly outside Europe.⁷²² The BASF lacquer group was quite able to compensate for the import and freight duties on its exports by streamlining and reasonably pricing bulk production in Germany. Most of all, hopes centered on the synergy effects expected of the interaction that Ludwigshafen's research and applied technology was to have with the lacquer subsidiaries.

Such ulterior motives, however, were not what moved BASF in June 1970 to absorb the Stuttgart Siegle Group, too. Once again, defensive thinking was uppermost in mind when a small “emergency managing board” hurriedly convened at Timm's residence in Heidelberg and issued a takeover bid.⁷²³ Those present agreed “that it could eventually spell mortal danger for BASF's pigment business if the Siegle Group joined with a competitor and if, on top of that, there emerged a combination consisting of Bayer, Hoechst, and the Siegel Group, which would be the world's most powerful grouping in the pigment area.” Under no circumstances could the Siegle Group be allowed to fall to Bayer or Hoechst. After conferring with Carl Wurster, Timm finally telephoned a representative of the owners to make BASF's bid: “DM 100 million in cash [and] a nominal DM 63 million in BASF shares with a

⁷²⁰ Oesterlin, Note, “betr. Mittelfristige Überlegungen für die Lackgruppe der BASF,” January 13, 1969, attachment to 2/69; BASF RA, minutes of the managing board.

⁷²¹ Minutes of the managing board meeting of January 15, 1969; BASF RA.

⁷²² Oesterlin, Note, “betr. Mittelfristige Überlegungen für die Lackgruppe der BASF,” January 13, 1969, attachment to 2/69; BASF RA, minutes of the managing board.

⁷²³ Dr. Hahn, memorandum on a managing board discussion in the home of Dr. Timm on June 9, 1970, attachment 1 to the minutes of the managing board meeting of June 15, 1970; BASF RA.

long waiting period before they were allowed to be sold." In terms of taxes, the transaction was to be handled through a BASF subsidiary, Wintershall AG. The family owners approved the sale the next morning. To BASF, their decision meant something like a reunification of the old Stuttgart line of founders, which had left the Badische Anilin- & Soda-Fabrik in early 1889, and the now better-positioned affiliate. Hence, old affinities may well have tipped the scales in favor of BASF in the decision made by Gustav Siegle's descendants, the families Gemmingen-Hornberg, von Tessin, and von Schrenk-Notzing. The BASF Group gained not only the paint factory G. Siegle & Co. GmbH but also its subsidiary, the printing ink manufacturer Kast & Ehinger GmbH, Stuttgart-Feuerbach, which Siegle had acquired in 1889 and which further rounded out the range of products offered by BASF's lacquer group.

The reorganization decided on for BASF's lacquer business in early 1972 stressed overriding "endeavors to keep streamlining the group structure."⁷²⁴ The main matter was to straighten out the Phrix debacle as inconspicuously and elegantly as possible. The losses incurred and Dow Chemical's withdrawal from the joint management of Phrix had diminished the original capital stock from DM 154 million to only DM 24 million. BASF Spinntechnik AG, as Phrix was now called, constituted the formal nucleus of a new corporation to be formed, BASF Farben + Fasern AG, Hamburg, and served as the company with which the lacquer subsidiaries merged. Assimilating profitable group companies into the renamed corporate shell of Phrix compensated for "some of Phrix's losses taxwise by making it possible to claim them against profits of these companies."⁷²⁵ To avoid prejudicing the market position of the lacquer plants and to refrain from jeopardizing the profit-making purpose of their independence, Ludwigshafen retained the valuable names of the lacquer plants and their economic continuity by setting up new management companies as "100 percent subsidiaries" under the existing names of the companies. Business operations of the aggregate company thereafter extended to the decentralized areas – coatings chemistry (Glasurit and Herbol), pigments (Siegle), printing ink (Kast + Ehinger), and the fiber area with all the remaining European activities of the BASF Group in that sphere. Of the total workforce's 6,000-odd members, 450 still belonged to the fiber area, which no longer contributed much (DM 18 million) to the aggregate company's value in the books of BASF AG (DM 640 million).⁷²⁶

⁷²⁴ Minutes of the managing board meeting of March 14, 1972 and the managing board document of February 24, 1972, attachment to 5/72; BASF RA; minutes of the managing board.

⁷²⁵ Danz to the members of the managing board, "betr. Festlegung der Verhandlungslinie mit Dow," October 5, 1970, attachment 2 to 44/70; BASF RA; minutes of the managing board.

⁷²⁶ Managing board document February 24, 1972, attachment to 5/72; BASF RA; minutes of the managing board.

Given this corporate mésalliance, it is not surprising that the restructuring failed to achieve its end of coordinating the lacquer area in some meaningful way. In 1973 a working group was created to monitor success, and in December, after its "business analysis of important corporate data," it sounded the alarm. Both Giasurit and Herbol diverged by more than 100 percent from their annual operational plans and were headed in 1974 for negative net operating results of at least DM 15 million. The working group saw the cause in entrepreneurial shortcomings in the area of coatings chemistry, where processes of consensus building and decision making took place at three levels whose business policy objectives were mutually inconsistent. Criticism was therefore aimed at the director of the coatings chemistry division, Hans Oesterlin, who was also both the director of the business in coatings chemistry and the spokesman of the managing board of Farben + Fasern AG. The judgment was unusually harsh: "The coatings chemistry division has not performed its entrepreneurial task. It has failed to fulfill its control functions and to come up with a short-, medium-, and long-term strategy." The management of the business in coatings chemistry had succeeded neither at "integrating Giasurit and Herbol nor at elaborating a sound corporate concept." The task force saw the company's leading position being jeopardized in the important areas of electrodeposition (a process in which a finish applied in an immersion cycle is given an electrostatic charge and then attracted to the intended substrate by high voltage) and priming. It therefore recommended rethinking the concept of Farben + Fasern AG. The short-term response, however, was to take two obvious, proven approaches for changing the situation quickly. First, the task force insisted on every possible way to streamline operations, reducing the workforce of 4,680 by 15 percent. With personnel costs averaging DM 25,000 a year per employee, the remedy effected a savings of DM 17.5 million, which offset the imminent losses. Second, Hans Oesterlin was replaced by Wolfgang Jentzsch as director of the division for coatings chemistry and had to accept the post of director of the Africa and West Asia division.

The crisis in coatings chemistry gave occasion enough to ask the key question that went beyond short-term reactions: Had the purchase of the lacquer enterprises been worth it?⁷²⁷ The lacquer business was bound to prove whether Magener was correct about using selective acquisitions for growth-oriented profit planning. The objective of this strategy had to go beyond buying turnover only; "buying" profit had to be the foremost goal. When answering the question about the success of his strategy, Magener therefore chiefly compared the returns and results of the three lacquer subsidiaries with the corresponding data of the parent corporation. With capital investment of DM 339 million, BASF had attracted DM 88 million of fresh shareholder

⁷²⁷ Finanzabteilung, "Untersuchung über die Entwicklung der Sparte Lackchemie," October 8, 1973, attachment 1 to 25/73; BASF RA; minutes of the managing board.

capital from 1965 through 1969 and had achieved a pretax annual result of DM 35 million on average. The return on the acquisition's purchase price thus came to 10.3 percent. By late 1971 the total capital of the three new subsidiaries had risen by 80 percent, whereas turnover had swelled by only 31 percent. By contrast, the equity ratio had declined from 58 to 49 percent. With net investments of DM 52 million and with DM 23.2 million in research costs for BASF AG in the lacquer area, it had been possible to raise the return on capital investment to 12.1 percent by 1971, a level exceeding the "country's customary interest rate" by about four percentage points.

But returns had plummeted to 5.8 percent since 1972, a level only a little more than half the interest rate, which had climbed over the same period. Return on total capital, that is, including borrowed capital, was similar. It was plain, moreover, that the lacquer subsidiaries had never matched the return achieved by BASF AG since the first acquisition in 1965. Except for the hard years of 1970 and 1971, the return on BASF AG in Ludwigshafen ranged from 6 to 12 percentage points above the return on lacquer. By 1973 the return on BASF AG had recovered from its low during 1971 (11.7 percent) and had reattained its accustomed level (17.9 percent), whereas this relation in the lacquer area had deteriorated to 5.5 percent – and an even worse figure was expected in the future. As in the area of magnetic technology earlier, the developments in lacquers, which were even more connected with BASF's core business in chemicals, forced Magener to see that the acquisitions of the past years had not been the ideal solution for growth-oriented profit planning.

Sales in coatings chemistry correlated closely with the business cycles of the two principal customers, the automotive and the construction industries. Since 1973, the year of the first oil-price shock, employment in both sectors had declined steeply. To cushion cost increases, notably those for oil as a raw material in the manufacture of lacquer, the lacquer division had to boost prices, triggering a downward spiral that incurred new losses. Culling the range of products, tightening distribution, and massive layoffs as suggested by the task force made little dent in this process. Streamlining did help somewhat, but the measures were not great enough to make up for all the losses in sales, which came to 8 percent in Europe in 1975.⁷²⁸ Reductions in working hours were barely avoided. The automotive industry did gradually recover from the slump, but demand from the construction industry and sales of industrial lacquers and special paints stayed so weak that results were unsatisfactory for years.

In the late 1970s exports of automobile lacquers came under pressure because more and more automotive manufacturers began producing their own lacquers and because the Deutsche Mark appreciated, driving up the price of West German exports. It was foreign business that offset a new drop in

⁷²⁸ BASF annual report for 1975, p. 17.

domestic demand in the early 1980s. The research work of the 1970s now paid off. The key thrust in those years had been to make progress toward environmentally friendly lacquers. In addition, innovative solutions to problems of automobile paints had been found, including new products such as a high-solids base coat for the booming business with two-coat metal-effect paints, which were new automotive immersion finishes that protected against corrosion and permitted longer warranties. Applied technology likewise contributed to success. To sow closer ties with the lacquering craft, Farben + Fasern AG opened an automobile lacquer design school in 1985, an idea that was soon exported as well.⁷²⁹

The revival of the lacquer division in the 1980s became eminently clear when it spread from Giasurit do Brasil to North America. In one stroke, acquisition of the Inmont Group (United Technologies), which employed approximately 8,000 people at 45 locations in 20 countries and had a turnover of \$1 billion, made BASF a major competitor on the U.S. market for printing inks and automobile lacquers.⁷³⁰ Simultaneously, yet another hold was established outside Germany with the formation of BASF Coatings B.V. in the Netherlands. Propelled by such breakthroughs, the lacquer division finally emancipated itself from the fiber division, with which it had been linked organizationally since 1972 in BASF Farben + Fasern AG. In early 1986, the new BASF Lacke + Farben AG thus transferred its seat from Hamburg to Münster-Hiltrup, Germany, where its most important German production plants lay. With 5,800 employees, DM 180 million in capital stock, and DM 1.4 billion in annual turnover, it coordinated a lacquer empire of global proportions. Lacke + Farben has upheld the old virtues of BASF to this day. Offering technologically advanced industrial lacquers and a new, environmentally friendly water-base lacquering technology for the automotive industry, the company adapted to the trend toward products of superior quality. To meet the burgeoning demand for this environmentally compatible lacquering system, work on a new production plant began in the town of Schwarzeide in southern Brandenburg in 1991. The creation of centers for applied technology was also pushed in order to bring BASF's own comparative advantage into play through wide-ranging advisory services. Although BASF kept its position as the world's leader in water-based metal-effect coatings, the contraction of the automotive market in the United States ate into earnings. In the 1990s this change prompted resolute focus on the most profitable product lines. The strategy was called "firming up the portfolio" and was henceforth followed no matter what the state of the economy.⁷³¹ The lacquer business also strove for "resilience against fluctuations in the business climate." Sales of automotive refinishes on the expanding markets of

⁷²⁹ BASF annual report for 1985, p. 32.

⁷³⁰ "BASF erwirbt Inmont-Gruppe," BASF, Press release of May 14, 1985.

⁷³¹ BASF annual report for 1977, p. 17.

Eastern Europe, Asia, and South America were best suited to meeting this condition. The product portfolio shifted more and more to low-emission, water-base, high-density coatings, and new metal-effect coatings. Among the industrial lacquers, BASF and other suppliers of systems with universal solutions eventually gained the upper hand. In all other ways, though, the product ranges were curbed, peripheral activities given up, turnover reduced, and results bettered. Thirty years after Magener put BASF on its new course, there was growing willingness to abide by his counsel strictly and embrace medium-term profit planning by abandoning low-profit products and promoting high-profit ones without merely acquiescing to a market fait accompli. In this sense, Lacke + Farben in the 1990s had arrived at the objectives that had been plotted in the 1960s.

Pharmaceuticals: The Early Bird . . .

Although BASF had been among the notable manufacturers of pharmaceutical products in the 1920s, that area had never counted as one of its main lines of business. In the division of labor conceived by IG Farbenindustrie, the pharmaceutical axis shifted to the north, where it flourished all the more between the lower Rhine River (Bayer) and Maingau (Hoechst). To the outside world, there was no difference. IG Farben, drawing no attention to itself, usually marketed its medicaments under Bayer's cross. Not surprisingly, BASF thus had no pharmaceutical division of its own when it set out to reconstitute itself after the trust was broken up. At the moment the company was refounded, it was not producing a single medical product.

The question whether this strategy was the right one arose early, particularly since BASF supplied raw materials and aids for the pharmaceutical industry and since synergies would have been imaginable, say, in the area of crop protection. Be that as it may, repeated discussions about the company's business policy on pharmaceuticals always ended in "the unanimous view that BASF shall not work on this area systematically but rather shall only act on such opportunities as come up in other work."⁷³² For fear of dissipating the company's energy, the managing board chose instead to cooperate in individual instances with pharmaceutical corporations such as Hoffmann-La Roche in Basel. In 1959, having introduced a superior procedure for manufacturing vitamin A, BASF finally had the opportunity to launch a pharmaceutical innovation rooted in its own research. But the company delayed making a strategic decision for a long time. It wanted to have a marketable product of its own before opting for one of the alternatives that Hoffmann-La Roche proposed: a plant under a BASF license or a joint venture with BASF. Two years later Ludwigshafen ultimately shied away from embarking

⁷³² Minutes of the managing board meeting of March 5, 1956; BASF RA.

spectacularly on the path of forward integration in the vitamin area, preferring the Swiss company's offer to have BASF supply it with vitamins A and E and with beta-carotene for five years exclusively at the discounted world-market price.

At that time, BASF reserved only the right to develop vitamin production for animal feedstuffs along with its own sales apparatus.⁷³³ But it shrank from making a grand entry into the vitamin market all by itself and from instituting its own sales system for the purpose. To reduce the economic risk significantly, the managing board in Ludwigshafen elected rather "to augment production unhindered if purchases are guaranteed." It accepted "that the vitamins in that case are normal chemicals for BASF and [that] the inauguration of a new line of business with all the attendant possibilities will be delayed by at least a few years." This decision, however, was plainly no longer grounded in principle but in pragmatism, heavily reinforced though they were by ingrained patterns of entrepreneurial thinking and behavior. In 1968, BASF finally terminated the exclusive contract with Hoffmann-La Roche and considerably escalated its own capacity in competition with the Swiss company. Even then, there were reservations "that the strengths of Hoffmann-La Roche in the vitamin area and the seriousness of the situation [ought] in no way be underestimated." For "after BASF facilities commence operations, the ensuing hard struggle with Hoffmann-La Roche will pose infinite risk for BASF's conduct." Timm was quite sure, though, that the preliminary stages of production at BASF were more profitable because of the company's fully integrated plant complex and that BASF procedures were simpler.⁷³⁴ He therefore dared to take the leap into forward integration.

Analysis of BASF's own interests left him no other choice.⁷³⁵ A decision was urgent because the DM 38.6 million program for large-scale technological improvements for the production of vitamins A and E and of the terpenoid odorants was up for approval in July 1968. Chemically, the program used a new synthesis of vitamin A that Horst Pommer had worked out in 1963, shortly after the contract with Hoffmann-La Roche had been signed. It consisted of the components C₅ and C₁₅, which were formed from simple, readily available, basic chemical substances (acetylene, acetic acid, acetone, and isobutylene [isobutene]) in numerous sequential steps of synthesis centered on Reppe chemistry and then linked to a C₂₀ molecule in a Wittig reaction. But yet another decision was impending in 1968. The exclusive supply contract with Hoffmann-La Roche had to be terminated by October or it would be automatically prolonged. Extending it would have

⁷³³ Horst Pommer, note: "eine Besprechung über unser Vorgehen auf dem Vitamin-Gebiet," April 11, 1962; BASF RA; minutes of the managing board.

⁷³⁴ Minutes of the managing board meeting of July 15, 1968; BASF RA.

⁷³⁵ Dr. Seefelder, Division IV, note, "betr. die Interessenlage der BASF auf dem Gebiet der Vitamine und Riechstoffe," June 12, 1968, attachment 2 to 20/68; BASF RA.

contradicted the expansion of BASF's own capacities, a project designed to enable the company to meet 50 percent of the world demand for vitamin A (600 tons a year) and 60 percent of the demand for vitamin E (800 tons a year) by late 1972. These shares of the market would rival those of the Swiss pharmaceutical corporation. The contract, however, stipulated only 80 tons of vitamin A per year as "the limit of the amounts that Roche would agree to purchase." The first contract (1962-3) was signed because Hoffmann-La Roche had an interest in "completely absorbing" BASF as a competitor. By contrast, BASF had wanted to reduce the risk of its initial investment. Whereas the objective of the Swiss had remained unaltered, BASF's interests had utterly changed in 1968. Applying all the rules of research *and* business strategy to plumb these interests was one of the first tasks by which Matthias Seefelder – the head of the responsible Division IV since April 1967 and the later chairman of BASF's managing board – could prove his competence for higher pursuits. He summarized the result of his sober analysis in five points. First, the contract would compel BASF to construct a small and thus uneconomical plant. Second, producing only small amounts of vitamin A was bound to adversely affect the costs of whole product lines in BASF's interlocking plant network, the verbund. Third, without access to the free market, BASF would not be able to consolidate its position as a producer of vitamin A in the long run. Fourth, after five more years as a supplier, BASF would have little hope of challenging the position of Hoffmann-La Roche. Fifth, antitrust law raised objections "to the exclusive tie of one major vitamin A producer to another." Seefelder drew a straightforward conclusion: "In the future, the two largest manufacturers of vitamin A will have to... find a good relationship as competitors. BASF's interests, however, rule out a contractual tie of BASF to Roche."⁷³⁶

During the five-year starting period, there were other occasions for BASF to lay the cornerstone for a pharmaceutical division. In April 1966 Hans Harms, a member of the managing board of E. Merck AG, contacted Timm to explore "a way for Merck to be acquired by BASF."⁷³⁷ For all his company's prosperity, Harms was worried that "at some point Merck's share capital formation will not suffice to sustain the company's commitments." He did not explicitly use the term "joint venture," but he did point out the "complementary interests of Merck and BASF in the vitamin area" and did indicate "that in this regard both sides could probably put up about equal amounts for a common approach." Timm agreed to the offer, though it had not been cleared with the "family council" of the owners. To bring up "the whole subject of the relations between Merck and BASF" in the family council, Timm quite accurately informed his interlocutor that he, Timm, could not

⁷³⁶ Ibid.

⁷³⁷ Timm, memorandum about a visit by Dr. Harms, E. Merck AG, Darmstadt, on April 25, 1966, attachment 4 to 14/66; BASF RA; minutes of the managing board.

keep the chances for cooperation in the vitamin area open indefinitely, for the American pharmaceutical corporation Pfizer was interested in a worldwide license for Ludwigshafen's vitamin synthesis. The managing board of Merck AG thereupon sent Timm "pretty specific proposals for cooperation in the vitamin area."⁷³⁸ Although joint laboratory experiments did result and "an inclination for closer integration between BASF and Merck" probably existed among members of the Merck family, too, there was no tangible outcome.⁷³⁹

In connection with Merck, the BASF managing board reiterated its intention not to introduce its own pharmaceutical division. Nevertheless, this aspect ran like a red thread through a fairly long report that Seefelder prepared in early 1967 on the utility of an offer from a different quarter.⁷⁴⁰ This time it came from the Quandt Group, which offered BASF a 50 percent stake in Byk-Gulden-Lomberg GmbH, Constance. Seefelder used his role and the moment to argue for "creating a pharmaceutical division within BASF." He first noted experiences that had yielded above-average rates of growth and profit for the pharmaceutical business. It was, he said, "relatively crisis-proof" and, because of increasing life expectancies, held out promise for "steady upward trends in turnover." He was convinced that BASF's entry into pharmaceuticals was traced out "by the development of the crop protection business and 'fine chemicals.'" The approximately 4,500 "selectively synthesized" new compounds for crop protection, along with about 3,500 fortuitous syntheses that occurred year after year, represented "hitherto unexploited potential for pharmaceuticals."⁷⁴¹ Until that point, some of "these potentially effective compounds" had originated at BASF itself and some had been offered as commodities to pharmaceutical companies for their use but had thus not achieved "any satisfactory result."

Hence, Seefelder recommended on principle acquiring a medium-sized, well-established pharmaceutical company in order to enter the medical drug business. Essentially, this description fit Byk-Gulden. The company had a good name and an efficient sales system abroad that maintained contact with physicians, pharmacists, and hospitals through a network of specialized consultants. But with a turnover of DM 60 million in 1965 and a pretax result of DM 3.5 million, its net operating margin of less than 6 percent lay in the lower ranks of the industry. Above all, future prospects and returns rested on a comparatively narrow underpinning. Moreover, 50 percent of Byk-Gulden's domestic turnover was jeopardized by expiring patents and by new

⁷³⁸ Minutes of the managing board meeting of September 16, 1966; BASF RA.

⁷³⁹ Minutes of the managing board meeting of December 19, 1966; BASF RA.

⁷⁴⁰ Seefelder, Research, "Notiz zu unseren Verhandlungen mit Byk-Gulden," January 5, 1967, Attachment 10 to 1/67; BASF RA; minutes of the managing board.

⁷⁴¹ *Ibid.*, emphasis in the original.

breakthroughs of other firms. Seefelder also regarded the research potential of the company in Constance as insufficient. After all, it had come up with no patents of its own in the preceding four years. All these detractions meant that Byk-Gulden was evidently "still viable for only a limited time." All in all, the Quandt Group had thought of BASF as a "blood donor." Seefelder estimated it would take four to five years to build a healthy company with above-average rates of growth and large fields of use for its products, "including vitamins (for human medicine)." In addition, every effort had to be mostly for the benefit of the partner, which put store in "the quickest possible returns." For these reasons, the only conclusion was that "an *acquisition* of Byk-Gulden on the basis of a 50 percent stake is not in the long-term interest of BASF."⁷⁴²

More important than this negative assessment was Seefelder's argument for having BASF's own pharmaceutical division, although the managing board did not concur at that time. The idea of infusing new blood by "purchasing companies whose earning power exceeded that of BASF" continued to have the support of Magener, whose growth-oriented profit plan had registered a negative balance for the first time in October 1967.⁷⁴³ Annual turnover, unlike that in previous years, threatened to fall DM 40 to 50 million below the already lowered target. Magener saw a fundamental problem behind this trend: "I suspect that BASF in its current condition [and] present range of products is unable in the long run to gather sufficient reserves – say, one-third to one-half the amount distributed – along with a 20 percent dividend, and this despite past investments of DM 2 billion." One of the chief conclusions he drew from this view was to require acquisitions by means of share exchange. Such acquisitions were intended to broaden the premium of shareholders' equity and thereby "sort of" replace the formation of reserves that BASF could not achieve all by itself. The motto had to be "don't sink any new money into worn-out ranges of products or low-yield areas; invest in high-yield, specialized areas instead." He knew where they were, too: "particularly the lacquer industry and the pharmaceutical industry." Animal feedstuffs and biochemistry likewise seemed conceivable to the managing board. It was explicitly decided to have BASF engage in pharmaceuticals – outside Germany as well, if necessary, or with a stake of 50 percent or less in order to become acquainted with this area, which was unfamiliar to the company.

BASF's pains to position itself on the pharmaceuticals market became ever more hectic as the day approached on which the company would be able to step from the shadow of Hoffmann-La Roche in the vitamin area. One of the most stinging defeats on this road was an abortive attempt to purchase

⁷⁴² Ibid., emphasis in the original.

⁷⁴³ Minutes of the managing board meeting of October 2, 1967; BASF RA.

shares of Schering AG in Berlin secretly.⁷⁴⁴ With capital stock of DM 164 million, Schering had a fair market value of DM 635 million when Timm began the maneuver. By the end, the price had climbed from 387 to 740, appreciating the market value to DM 1.2 billion. Accordingly, the grapes hung "really too high" for BASF, as Timm later conceded at a shareholders' meeting.⁷⁴⁵ The grapes were definitely not sour. The Berlin company made 15 percent of its turnover on contraceptive pills alone, but it mainly produced drugs, crop protection products, pesticides, and industrial chemicals. In one stroke, BASF would thus have won the solid footing in pharmaceuticals that it so urgently needed to improve its earnings. Other chances, such as the acquisition of the American company Dawe's Laboratories⁷⁴⁶ and the French Société Industrielle pour la Fabrication des Antibiotiques (S.I.F.A.),⁷⁴⁷ also fell through. It long looked as though BASF would not achieve a large presence in pharmaceuticals, for the companies of the pharmaceutical industry were "so firmly entrenched" in general "that the chances for any affiliation worth mentioning were remote indeed, even by way of acquisition."⁷⁴⁸

At bottom, nothing about this situation was changed by the fact that Timm did finally manage to purchase at least the twelfth largest West German pharmaceutical company, Nordmark-Werke GmbH in Uetersen, in August 1968. The family enterprise, which had been founded in 1927, had an annual turnover of DM 53 million in medicaments, attaining a pretax result of DM 5.1 million.⁷⁴⁹ Its research department enjoyed a solid reputation and accounted for one-tenth of the 850 employees. But Nordmark-Werke did not have the critical mass that really would have catapulted BASF into the center of the pharmaceutical market. Timm allowed the entry into the sector to cost him something anyway. After tough negotiations with the spokesmen of the family owners, Alfred Voss and Julius Wolf, the company's capital of DM 13.9 million was valued at 700 percent and was traded for BASF shares from authorized capital at the nominal value of DM 20 million, which were worth DM 100 million at a market price of 500 points. In any case, the acquisition of Nordmark finally made it possible for BASF to create its own pharmaceutical division (*Sparte VI*), headed by Pommer.⁷⁵⁰

The pharmaceutical business thus suddenly occupied center stage in the managing board's thinking. Whereas the intercorporate participation in

⁷⁴⁴ Rolf Magener's assessment, interview with Dr. Rolf Magener on December 3, 1999, in Heidelberg. Records in BASF UA.

⁷⁴⁵ Transcription from a tape recording of the minutes of extraordinary shareholders' meeting on November 17, 1970; BASF UA, C 21, 126.

⁷⁴⁶ Minutes of the managing board meeting of January 29, 1968; BASF RA.

⁷⁴⁷ Minutes of the managing board meeting of February 19, 1968; BASF RA.

⁷⁴⁸ Transcription from a tape recording of the minutes of extraordinary shareholders' meeting on November 17, 1970; BASF UA, C 21, 126.

⁷⁴⁹ Minutes of the managing board meeting of April 4, 1968; BASF RA.

⁷⁵⁰ Minutes of the managing board meeting of August 19, 1968; BASF RA.

Cassella Farbwerke Mainkur AG had received little attention and had even been seen as a liability during the tedious negotiations and strategic considerations concerning the second breakup of IG Farben interests, this attitude now changed completely. BASF was still prepared to dispose of its stake in Cassella in exchange for appropriate compensation, but Cassella's pharmaceutical business, which made one-third of the profit earned by this successor to the trust, came to be seen in a wholly new light.⁷⁵¹ The managing board contemplated separating out the pharmaceutical and cosmetics area and its turnover of DM 31 million. In competition with the Swiss pharmaceutical corporation Geigy, BASF also conducted parallel negotiations on acquiring the Allgäu medicine manufacturer Mack, Illertissen. The acquisition of Mack, for which Geigy had initially bid DM 110 million, now seemed "of crucial importance for building the pharmaceutical division of BASF," so the managing board was willing to "match the Geigy bid and outbid Geigy if necessary" at almost any price.⁷⁵² In Timm's business calculus, the pharmaceutical division had meanwhile become so important that he explicitly excepted it from "a phase of consolidation" that he announced in October 1969 when he promised the supervisory board that no further acquisitions were to be undertaken.⁷⁵³ The slow progress with the pharmaceutical division in the next few years thus did not reflect a lack of will but rather a lack of opportunities. Ultimately, BASF lost both the tug-of-war over Cassella and the battle with Geigy over the bid for Mack. At times, the family owners seemed ready to sell a participation of what was at first 70 percent, for which BASF wanted to pay a total of DM 95 million.⁷⁵⁴ But Geigy could not be shaken off, and in the end it triumphed.

Another setback in the endeavors to widen BASF's pharmaceutical base came in the struggle for a participation in Knoll AG, Ludwigshafen. Since early 1969 the bank department had been quietly trying to acquire small lots of Knoll shares in order to accumulate at least an intercorporate participation of 25.1 percent.⁷⁵⁵ But in mid-May, with 14 percent of the company's share capital in BASF hands, these exertions failed against the resistance of organized shareholder groups and the family. Knoll's three largest shareholder groups, which held around 60 percent of the shares, had agreed not to sell, and most of the family members who had not already sold their shares to BASF had been talked by this opposition into a pooling contract in which approximately 80 percent of the capital was collected. Up to that point the

⁷⁵¹ Magener to the members of the managing board, "betr. Besprechung mit den Farbenfabriken BAYER am 31. März 1969 im VB Frankfurt," April 1, 1969, attachment 6 to 10/69; BASF RA; minutes of the managing board.

⁷⁵² Minutes of the managing board meeting of August 11, 1969; BASF RA.

⁷⁵³ Minutes of the managing board meeting of October 6, 1969; BASF RA.

⁷⁵⁴ Minutes of the managing board meeting of May 25, 1970; BASF RA.

⁷⁵⁵ Minutes of the managing board meeting of May 19, 1969; BASF RA.

maneuver had cost BASF a nominal DM 10 million in BASF shares that had come from authorized capital. It was another of Timm's unfulfilled hopes to spur the belatedly launched pharmaceutical division into the chase to catch up on shares of the market. Not even the Federal Association of the Pharmaceutical Industry took BASF's ambitions in the area seriously. Its chairman, Curt Engelhorn, explained his disapproval, "noting that BASF AG did not manufacture any pharmaceutical specialties and thus had no legitimate say in the association."⁷⁵⁶ In a 1971 address to employees "with managerial responsibilities," Pommer radiated serenity. Invoking the "solid growth of our pharmaceutical business," he reminded his audience that one need "only have the patience to wait for harvest time," but he was just whistling in the dark.⁷⁵⁷ In reality, BASF was losing time.

Not until 1973 was there awareness of "internal deliberations among the Knoll shareholders" that could mean a ray of hope for "raising BASF's stake to 25 percent in the foreseeable future."⁷⁵⁸ By then, control over Knoll AG was sought by Chemie Grünenthal GmbH, a pharmaceutical company in Aachen that had gained notoriety in the 1960s through a scandal involving Contergan, a soporific that caused severe deformities in unborn children when mothers took the drug during pregnancy. Grünenthal had already achieved an intercorporate participation of 25.1 percent, which it used to frustrate the quest to increase BASF's influence. At mid-year the question was even broached "whether we should look into selling our Knoll shares." After BASF's wish for representation in the supervisory board had been "deliberately ignored," the managing board saw no further concrete ways to "round up" BASF's double-taxed stock ownership into a blocking minority.⁷⁵⁹ A year later the managing board was vindicated in its refusal to give in to the defeatist mood and its retention of the shares. In Timm's final days as managing board chairman, the chance came to purchase 56.9 percent of the share capital of DM 45.9 million from the 64 Knoll shareholders of the founding family and thereby add to the 15.1 percent that BASF had come to hold in the company by then.⁷⁶⁰

At this point, Knoll AG's group turnover of around DM 355 million ranked it sixth among the German pharmaceutical enterprises, behind Hoechst, Bayer, Boehringer, Schering, and Merck.⁷⁶¹ Among its specialties, which made up 70 percent of its turnover, were cardiovascular drugs. The company also produced fine chemicals (ephedrine, purines) and hospital

⁷⁵⁶ Pommer to the members of the managing board, Ludwigshafen, October 5, 1970, attachment 4 to 45/70; BASF RA; minutes of the managing board.

⁷⁵⁷ Pommer, "Die Aktivitäten der BASF auf dem Pharmasektor," in *Informationsveranstaltung für Mitarbeiter mit betrieblichen Führungsaufgaben*, July 12, 1971, p. 16.

⁷⁵⁸ Minutes of the managing board meeting of January 16, 1973; BASF RA.

⁷⁵⁹ Minutes of the managing board meeting of July 10, 1973; BASF RA.

⁷⁶⁰ Minutes of the managing board meeting of June 14, 1974; BASF RA.

⁷⁶¹ "Expertise Knoll," attachment 4 to 16/74; BASF RA; minutes of the managing board.

equipment. Its production operations were state of the art, a standard due partly to an investment rate of 10.6 percent of the turnover (1971–3), which was considerable compared to the corresponding figure for BASF AG (8.3 percent). Total return on investment came to 29 percent in 1973, higher than the figure for Nordmark-Werke (23.7 percent) and much higher than that for BASF AG (11.2 percent). A majority stake in Knoll could not help but finally make something of the pharmaceutical division's languishing strategy of "cooperating with suitable partners throughout the world." It strengthened BASF's pharmaceutical research, permitted its clinical facilities to be used for BASF pharmaceutical products, and gave BASF new distribution channels for its patent-free ingredients. Given the attractiveness of the pharmaceutical operations, it was no wonder that foreign competitors such as DuPont, Beecham, and Pfizer were also eyeing Knoll AG, an interest that drove up the price. However, Seefelder was determined this time not to miss his chance, and he won. For the first time since 1975, BASF had what it took to pursue the pharmaceutical business seriously – seven years after the decision to do so, though another seven years were to pass before the takeover of Grünenthal's intercorporate participation. Besides the parent works in Ludwigshafen, the Knoll Group had a production plant in Minden, associated companies in Germany, and sales outlets throughout the world. On BASF's side there were Nordmark-Werke and Laboratoires Biosedra S.A., Paris, half of which had been acquired in 1971 (and which BASF has fully owned since 1977). In 1980 Knoll took over from Schering the other 50 percent of the Knoll Pharmaceutical Company in Whippny, New Jersey, which the two companies had operated jointly until then. By the mid-1980s two-thirds of BASF's sales from pharmaceuticals were coming from outside Germany. Many of the prospects that now unfolded also promised further advantages, such as cooperation with the American pharmaceutical enterprise Bristol-Myers Corporation in the field of antibiotics, and the use of partners' distribution channels for BASF's own range of products.⁷⁶² Efficiency was enhanced, too, because each field of use for drugs in medical research could be localized in a single laboratory, making it possible to reduce development time and to free capacity for new areas. All in all, the odds on getting "a good return" through a high rate of innovation looked favorable.

In the 1980s BASF did not significantly expand its pharmaceutical business, which it clustered in Knoll AG. In 1989 sales of pharmaceuticals came to DM 1.8 million, or 3.8 percent of BASF's total turnover.⁷⁶³ By comparison, the health sector, whose business areas consisted of pharmaceuticals, self-medication, diagnostics, and biochemical products, accounted for 18.4 percent of the turnover at Bayer and 29.5 percent of its profit and

⁷⁶² Ibid. ⁷⁶³ Teltschik, *Geschichte*, p. 327.

loss.⁷⁶⁴ The corresponding numbers for Hoechst were 18.1 percent and 22.8 percent. Knoll's turnover of medical preparations had mainly to do with the cardiovascular drug Isoptin® (introduced in 1981) and the antirheumatic drug Rythmol® (known in some countries as Rytmonorm®). R&D focused on the cardiovascular area, the central nervous system, and oncology. BASF entered the field of genetic engineering relatively late (1989), building BASF Bioresearch Corporation, a genetic-engineering research center that opened near Boston in the early 1990s. In 1988 an application was submitted for construction of another genetic-engineering facility, this one focused on a cancer drug, tumor necrosis factor (TNF). However, the project was delayed until 1991 by protests from critics of genetic engineering. BASF hoped to enter the market with human protein by manufacturing endogenous protein, but the company ceased research on TNF in 1993.

After acquiring Knoll, BASF consolidated the neighboring segment of fine chemicals, primarily through the purchase of promising specialty enterprises outside Germany, such as the American producer of odorants and flavoring agents, Fritzsche Dodge & Olcott (FDO), which was acquired in 1980. With this area of activity reinforced, BASF ascended in the 10 years thereafter to become one of the leading manufacturers of raw materials for cosmetics, particularly hair-care products. It was thus a surprise in this sector when FDO was sold in 1990. The stated reason for the move, however, suggests a leitmotif of BASF's corporate strategy in the 1990s: "Careful strategic examination shows that this area is not a core business of BASF in the long run, although FDO has achieved a leading position on the market for odorants and flavorings."⁷⁶⁵ A re-evaluation of the pharmaceutical division's entrepreneurial status did in fact seem in order. From 1987 through 1990 the pharmaceutical industry was engulfed by a gigantic wave of mergers, and many medium-sized companies unable to keep pace with the costs of the necessary research were forced to cooperate with the major corporations or be incorporated by them. By 1989 BASF ranked only 48 in the list of the ever larger international pharmaceutical groups. It thus stood far behind Schering (30) and only just ahead of the Darmstadt family business E. Merck (50), which had progressed on its own since 1966, when it had sought either cooperation with or acquisition by BASF. Hoechst and Bayer were fifth and sixth, respectively.⁷⁶⁶ Even in the context of the German pharmacy business, BASF-Knoll ranked only seventh, with DM 298.6 million in turnover.

At the international level BASF's pharmaceutical area was therefore a particularly awkward size: too small for the world market and too large for a niche. In the first half of the 1990s, the pharmaceutical division tried again to improve its position on the booming market. It acquired a majority stake in the Italian pharmaceutical group Bioresearch, having already taken over the Austrian enterprise Leopold+Co. GmbH and the Spanish company

⁷⁶⁴ Ibid., p. 324.

⁷⁶⁵ BASF information, July 4, 1990.

⁷⁶⁶ Teltschik, *Geschichte*, p. 318.

Laboratorios Made S.A., Madrid. In 1993 the BASF Bioresearch Corporation completed new laboratories in Worcester, Massachusetts. But it still had no efficient distribution system in the United States, the largest pharmaceutical market in the world. The division made a great leap forward in 1995 by acquiring the activities of Boots Pharmaceuticals from the British enterprise The Boots Company PLC. The transaction was supposed to be linked to a reorientation of pharmaceutical strategy oriented to business in nongeneric drugs and the markets in Great Britain, France, and the United States. Responding to a market trend, BASF tried to enter the business of generic products as well, setting up BASF Generics GmbH in Germany for that purpose and commencing a joint venture with Ivax, the largest generics manufacturer in the United States.⁷⁶⁷ Turnover was only modest, though, so the attempt long stayed mired in the red despite the high expectations attached to this sector.

Two years later, the pharmaceutical division sought one last time to enlarge itself. In 1996 it bought a majority holding in the Japanese pharmaceutical firm Hokuriku Seiyaku Co., Ltd., procuring its own infrastructure for developing and selling its products on the world's second largest pharmaceutical market. Total turnover of the pharmaceutical business rose by 15 percent to DM 3.5 billion in 1997 and seemed to come along well in the years thereafter, with new medications being successfully launched, too. In 1999 Ludwigshafen estimated the annual worldwide sales potential of new, nearly marketable projects to be €1.2 billion.⁷⁶⁸ Nevertheless, this scale was obviously too small to establish the pharmaceutical division as a core business of BASF. In 2000 the area's turnover of €2.5 billion still came to less than one-tenth of the group's turnover and 0.7 percent of the world market. Early in the year the financial press anticipated this eventuality, airing "the old speculation that BASF could sell its pharmaceutical activities."⁷⁶⁹ The press was alluding to rumors that BASF and Bayer had agreed to operate their pharmaceutical business jointly or sell it, and the Swiss pharmaceutical corporation Novartis AG was mentioned in this connection. "After a thorough examination of various options" in the course of 2000, it was decided to sell the BASF pharmaceutical business to a major enterprise in the field. The sale to one of the sector's leaders, Abbott Laboratories in Illinois, which had a turnover of \$13.7 billion and a net profit of \$2.8 billion, went ahead in March 2001 after approval by the European and U.S. competition authorities. It meant \$6.9 billion in cash for BASF and provided what the company saw as a key condition for "concentrating even better . . . on the strengths of its portfolio in order to achieve additional profitable growth."⁷⁷⁰

⁷⁶⁷ BASF annual report for 1994, p. 26. ⁷⁶⁸ BASF annual report for 1999, p. 32.

⁷⁶⁹ "Die BASF baut ihr Pharmageschäft grundlegend um," *Frankfurter Allgemeine Zeitung*, January 20, 2000.

⁷⁷⁰ BASF, press information of March 2, 2001.

Back to the Roots

Selling the pharmaceutical division made a clean break with a strategy that had been conceived to shift BASF's entrepreneurial direction belatedly, but deliberately, away from its traditional core business, chemicals, to new, future-oriented, and lucrative fields of business. Forward integration was supposed to open up the entire range of value creation to the company, from the raw materials base to the final consumer. The end of the pharmaceutical division was also the end of the long series of consumer-oriented products that the company had selectively and systematically introduced since its strategic shift in 1963 in order to promote its earning power. Reference to "consumer products" as an independent area of work ceased in BASF's annual report as of 1995. What remained of that area was subsumed either as finishing or processing agents (in the lacquer division) or as health and nutrition products (in the pharmaceutical area). Even where the strategy of forward integration had been successful, as in the lacquer business, the weight of areas for consumer end products had drastically declined. The solid performance of the lacquer division was reflected especially by automotive and industrial lacquers (an area of business known as "coatings" since 1997), where demand came not from the end consumer but rather from other companies.

BASF's backward integration to the raw materials of oil and gas seems to have had greater success despite major problems at the start. This strategy, which began with the acquisition of Wintershall AG from 1968 to 1969, was consolidated by cooperation with a Russian organization, Gasmulti OAO Gazprom, in 1991. Although BASF's share of Germany's trade in natural gas is gradually approaching 20 percent under this arrangement, the segment is far from the strategic magnitude the company has sought for its dealings on the world market since the 1990s. But the success of the strategy, part of whose aim is to ensure BASF's supply of raw materials, is undiminished. Earning more than €1.3 billion in 2000, the operating results of activity in oil and gas has more than doubled, the greatest gain of any segment.⁷⁷¹

It is difficult to see this contrast as coincidence alone. There were manifest cultural and mental barriers preventing BASF's successful advance in processing. It lacked nearly everything it needed to respond to the peculiarities of downstream markets. The qualities that made the company's core business so competitive – technological knowledge, technical perfection, and the innovative power of BASF's vast, fully integrated production complex – often complicated the integration of newly formed and acquired subsidiaries. Where marketing mattered, BASF's old virtues tended to be stumbling blocks. In early 1969, when McKinsey & Co., Inc., scrutinized BASF's corporate organization for the first time, the consultants believed they saw "a pronounced, deeply rooted corporate philosophy" and stated that overcoming

⁷⁷¹ BASF annual report for 2000, pp. 40–1.

it would be the “fundamental prerequisite for lasting change.”⁷⁷² They had identified “the chemist’s unchallenged pre-eminence to the detriment of other functions” and a “research-oriented procedure” that “plainly interferes with creativity . . . by defining [strict] responsibilities.” The tendency for decisions to be made mainly in groups rather than by individuals was another legacy of BASF’s corporate culture that the corporate consultants from Düsseldorf wanted to eradicate. In light of the then still recent turn to high-profit consumer products, another obstacle was the “manufacturer mentality” (“We can sell everything we produce”), which was associated with the glaring weaknesses in BASF marketing. Lastly, McKinsey supported Magener’s expansionist course with impressive numbers. By the late 1960s, the acquisitions of BASF AG had contributed 40 percent to the BASF Group’s 12.6 percent improvement in turnover. Without them, the Group would have achieved 7.8 percent, only slightly above the world average in the chemical industry. As much as these early acquisitions met Magener’s expectations for growth, however, McKinsey believed they were hitting narrow profit limits primarily because of these and similar mental confines. Only managers “with the necessary skills” would be able to find remedies, but the traditional patterns of skills and backgrounds among employees at that level of the BASF hierarchy made one thing easy to forecast: “Ultimately, the scarcest resource at BASF will be qualified managers.”⁷⁷³

Of all places, it was the particularly auspicious markets outside Germany where the development of the new powerhouses suffered the irksome effects of yet another institutional feature of BASF: the fact that regional management of the BASF Group was conducted from headquarters in Ludwigshafen.⁷⁷⁴ BASF faced an almost intractable dilemma in this regard. In order to acquire critical mass and market position, there was need for a clear distinction between and emphasis on consumer products and pharmaceutical products, the volume of which was still small.⁷⁷⁵ Yet the repeated call for this change simultaneously escalated the need for that rarest of BASF resources: entrepreneurial competence on markets that were still alien to the company. The want of it had thwarted the foray into the pioneering American market for magnetic and data mediums. The tortuously slow entry into the pharmaceutical market despite the managing board’s firm intentions did not exactly exemplify high-quality entrepreneurial strategic planning, either. The lack of leadership and entrepreneurship pervaded the ranks of the future managers. The greatest shortage was in all-round managers capable

⁷⁷² McKinsey, First Intermediate Report – Discussion with BASF’s Vorstand, January 13, 1969, UAM, BAS 01 690113 II.

⁷⁷³ Ibid.

⁷⁷⁴ Albers, Ressort C, to Seefelder, June 11, 1979; BASF UA, C 13.

⁷⁷⁵ McKinsey, “Stärkung der strategischen Führung der BASF-Gruppe. Diskussionsgrundlage für die Zwischenklausur des Vorstandes über die Weiterentwicklung des Führungssystems für die 80er Jahre,” October 1–2, 1979 (BASF #46); UAM, BAS 46 791002.

of cultivating and proving their entrepreneurial talent with different challenges. Fully 80 percent of the official young managers in 1969 had practical work experience in only one function.⁷⁷⁶ Moreover, 75 percent of them had made their careers solely in Ludwigshafen. It is hardly surprising, then, that McKinsey, 10 years after its first analysis of BASF's entrepreneurial and organizational shortcomings, again riveted attention on the enduring weakness of the market orientation and urged "more entrepreneurship."⁷⁷⁷

Ludwigshafen lacked neither the awareness nor the self-critical assessment needed to respond effectively. Whereas the managers interviewed by McKinsey at all three management levels still attached only "medium" significance to the shift toward consumer-oriented products for the 1970s, they forecast that it would have "high" significance for the 1980s.⁷⁷⁸ But they also unanimously agreed that the mobility, international experience, and marketing know-how of managers in 1979 would not "suffice to meet the demands of the 1980s." Only the interviewed members of the managing board thought that the necessary marketing expertise "existed to a limited extent." In the meantime, the persuasion that BASF had "to continue shifting increasingly from industrial to consumer-oriented products in order to preserve its competitive position" ranked at the top of the list of "reasons for developing the organization further."⁷⁷⁹ McKinsey still believed that the problem lay in the fact that the market orientation was too weak in some places "because traditionally it is often only production aspects that dominate." Seefelder adopted this argument completely, concluding that "in the future we will be forced to rethink, especially in terms of commodities, for which market success can still be ensured only by differentiation through marketing."⁷⁸⁰ Although the product divisions had meanwhile received worldwide responsibility for product policy, they did not bear worldwide responsibility for the results.

Magener's recipe was still valid in the early 1980s, for Seefelder, too, sought to "build up and defend a strong market position by selectively concentrating on vigorously growing lines of business and by fostering market orientation."

⁷⁷⁶ McKinsey to the managing board of the Badische Anilin- & Soda-Fabrik AG, "Ausrichtung der BASF auf die Zukunft," May 8, 1969; UAM, BAS 01 690500 I.

⁷⁷⁷ McKinsey, "Stärkung der strategischen Führung der BASF-Gruppe. Diskussionsgrundlage für die Zwischenklausur des Vorstandes über die Weiterentwicklung des Führungssystems für die 80er Jahre," October 1-2, 1979 (BASF #46); UAM, BAS 46 791002.

⁷⁷⁸ McKinsey, "Stärkung der strategischen Führung der BASF-Gruppe. Ergebnisse der Zwischenklausur des Vorstandes über die Weiterentwicklung des Führungssystems für die 80er Jahre," Anhang, Ludwigshafen, October 8, 1979; BASF UA, W 1 (Personenarchiv, Dr. Hans Albers).

⁷⁷⁹ McKinsey, "Stärkung der strategischen Führung der BASF-Gruppe durch eine Weiterentwicklung des Führungssystems für die 80er Jahre, Ludwigshafen, March 1980, UAM, BAS 46 800300.

⁷⁸⁰ McKinsey, "Stärkung der strategischen Führung der BASF-Gruppe – Weiterentwicklung des Führungssystems für die 80er Jahre, Ludwigshafen, March 8, 1980; BASF UA, W 1 (Personenarchiv, Dr. Hans Albers).

The slogan was not ineffective. After all, it had characterized BASF's path for decades. Nor was it unsuccessful, for the net income from most of the consumer products remained for many years as high as the rate of return on the enterprise as a whole. Surprisingly, however, it had no effect on BASF's core business. On the contrary, BASF focused on its old strengths. Whereas many of its long-time competitors left the field of chemistry and opened up new markets for themselves with varying degrees of success, BASF became the world's largest chemical company. It is true that BASF's product lists are longer at the turn of the twenty-first century than they were when the company was re-established in 1953, and many of its current products either existed only in rudimentary form then or now differ from those earlier versions in all but name. But the business areas are (again) the same: high-grade chemicals, plastics, dyestuffs and pigments, dispersions, coatings, crop protection products, fine chemicals, crude oil, and natural gas.⁷⁸¹ BASF's fortés lay not in an advance into consumer-oriented markets, Magener's hope for extraordinary earnings. They lay instead in Timm's verbund system – the co-operative, integrated configuration of plants resulting from the calculated, economical use of synergies from interlocking lines of production, intricately coordinated technical infrastructures, and different human and material resources. This system ensured the company its superior cost competitiveness – its cost leadership – in its traditional markets and provided an exportable pattern for expansion into the most important chemical markets. Above all else, however, it enabled BASF to profit from its comparative cost advantages, which have ultimately been decisive both institutionally and materially on typical markets in the chemical sector.

The managing board's insight into these interrelationships did not mature until the early 1990s. The task of translating it into specific strategies of portfolio management fell to the first nonchemist ever to head BASF, the lawyer Jürgen Strube, who won out in 1989 against the Group's head of finance, Ronaldo Schmitz, another nonchemist. Like Strube, the university-trained businessman had been promoted by Magener, leaving no chemist to succeed Hans Albers, who moved to the supervisory board in 1990. Both candidates embodied the "new course" that had been charted by Magener, and both were partial to his thinking. Strube's appointment as chairman of the managing board must therefore not be interpreted as a choice to change directions. Schmitz's candidacy foundered mostly on differences of opinion with the chairman of the supervisory board, Seefelder, about the degree of risk that BASF could assume in large-scale investment in the oil business.⁷⁸²

The fact that the company for the first time did not have a natural scientist as chairman of the managing board should not be attributed the significance

⁷⁸¹ BASF annual report for 2000, p. 3; see also BASF, *Bericht*, pp. 31–5.

⁷⁸² Interview with Prof. Matthias Seehofer on December 2, 1999; BASF UA, record of the interview.

it often seemed to have in public.⁷⁸³ Far more important than the academic background of the new chairman was his occupational socialization, which began at BASF immediately after he received his doctorate. Strube joined Magener's finance department in 1969, served in Antwerp and in logistics, and earned his operational spurs in the management of BASF Brasileira in São Paulo beginning in 1974. In 1982 he took over the overall management of the Brazilian operational theater, including BASF Quirnica de Bahia, Glasurit do Brasil, and Knoll. After appointment to the managing board, he was in charge of BASF's activities in North America from 1985 through 1988, then again for Latin America as well as for foams, polyolefins, and PVC worldwide. He was also responsible for the ailing parts of the magnetic-tape division that were left after Comparex Informationssysteme GmbH was disincorporated from it. He finally sold those remnants in 1997, six years after his appointment as chairman of the managing board, ending a 60-year era of magnetic tape. The pharmaceutical business, from which BASF likewise disengaged, was as familiar to him from his own experience with Knoll Brasilien as the verbund system was, which he was soon in the habit of extolling at every opportunity as chairman of the managing board.

Nowhere is the durability of BASF's corporate culture plainer than in the career patterns of its leaders, and no one is better able to recognize and deal with its strengths and weaknesses than those who have lived it for decades. The decision in the early 1990s to trim down BASF's portfolio and build on the accomplishments of the company therefore did not come without a final attempt at achieving sustainable, competitive shares of the market at least in the pharmaceutical area.⁷⁸⁴ When it did not become clear that this objective would be met within the foreseeable future, and when the magnetic storage sector even started registering dangerously high losses, the managing board under Strube parted with long-held visions and hopes, albeit not easily. However, the interlocking, cooperative management of production operations was a concept that provided the foundation and a broad field for alternative and profitable investment strategies.

10. UPHEAVAL AND PERSISTENCE

Toward the Transnational Company

As the largest chemical company in the world, BASF has indisputably emerged as a global player. It has a strong position on the American market, where Geismar and Freeport have emerged since the 1970s as two giant,

⁷⁸³ "Non-chemist wins top BASF job," *Financial Times* (London), December 18, 1989; "Ein Jurist soll den Konzern in das Jahr 2000 führen," *Handelsblatt* (Düsseldorf), December 18, 1989.

⁷⁸⁴ Interview with Mark Milner, *The Guardian* (London), August 8, 2001.

broadly integrated production complexes. It already has built or is building the same kind of organization in Antwerp, Tarragona, Kuantan, and Nanjing. The regional distribution of its turnover also makes BASF a global enterprise. Customers in Germany accounted for only €7.9 billion, or 22 percent, of the Group's total turnover of just under €36 billion. Technically speaking, global activity is one of the strategic objectives of the Group's corporate policy, even in BASF's own eyes. Since the 1990s, it has relied on major production plants that enable it to manufacture on a global scale. The more that is produced in such world-scale plants, the lower the fixed costs are per ton and the greater the economies of scale that guarantee superior cost competitiveness on the world market. BASF sees itself as a global player in another sense as well. By expressly adopting the principles laid down by the United Nations and the International Labor Organization (ILO) for global enterprises, it respects human rights and abides by basic work norms and environmental standards. It signed the Global Pact of the United Nations as proposed by General Secretary Kofi Annan at the world economic forum in Davos in 1999.⁷⁸⁵

Resisting the label of globalization for its own worldwide group development, BASF thinks of itself as a transnational company and associates this view with a philosophy.⁷⁸⁶ Unlike other multinationals, BASF does not wish to propagate its own corporate culture in all its facets throughout the world. Wherever the company operates outside Germany, it instead seeks values it can share with its local partners – a common denominator. The principle of thinking globally and acting locally is rationally grounded and definitely has economic merit. Each site has comparative institutional and material advantages for particular product markets, an edge manifested as competitively low production and transaction costs. By orchestrating the strengths of the various regional locations, BASF benefits whenever it manages to exploit their different institutional frameworks and corporate cultures productively within the context of a global strategy.

BASF's transnational path shows that the company has not been intent on exploiting the social and economic differential between the main economic regions. In the 1950s, the company decided to face the American challenge rather than take the seemingly simpler approach of setting up production sites in developing and emerging countries – an alternative that was even suggested by the West German foreign trade and payments policy under Ludwig Erhard. The experience that BASF had on the U.S. market also shows how difficult and arduous the North American option can be. In the 1960s, the specific conditions of the German social system of production permitted long-term business planning, with decision-making horizons allowing for

⁷⁸⁵ www.unglobalcompact.org/Portal/

⁷⁸⁶ Chairman of the managing board Jürgen Strube in an interview with Mark Milner, *The Guardian* (London), August 8, 2001.

lean periods of up to 12 years and more when a far-reaching objective was at stake. BASF's sales proceeds within the North American Free Trade Area (NAFTA) in the early twenty-first century (€8.4 billion) exceeds the corresponding figure for Germany (€7.9 billion) and are well on the way to an even wider gap. BASF purchased the crop protection business of American Home Products for \$3.8 billion in 2000 and transferred the headquarters of its own crop protection division from the traditional site at Limburger Hof to Mount Olive, New Jersey, the new central office of BASF Corporation.

In helping to combat the conditions that the world community deems anachronistic and inadequate, internationally accepted standards and principles for worldwide business operations promote the positive use of institutional differences. BASF expects its suppliers to meet at least minimum social standards and holds these businesses to internationally accepted basic values and guidelines for responsible behavior and integrity. BASF's conditions for purchasing technical goods stress recognition of the "Fundamental Human Rights at the Workplace as introduced by the ILO since 1998. If it is determined that the contractor is violating these work standards, BASF reserves the right to terminate the contract – even without notice if necessary – taking into account the conditions of the country in question."⁷⁸⁷ Suppliers of raw materials, €6 billion of which BASF purchases each year, thereby share in the responsibility for the product. As a customer, BASF keeps safety in mind and uses a matrix to assess each product for its chemical and physical properties and then assign it to different classes depending on the level of hazard it represents. Each potential risk detected is examined individually. If there is no water-treatment plant or if local producers have no standards meeting the minimum regulations that the chemical industry introduced worldwide for environmental protection, safety, and health in 1992, these suppliers are initially excluded from further purchases. The idea of Responsible Care® also includes the principle that economic concerns do not have priority over safety, health, and environmental protection, a stance that BASF has explicitly taken since 1986.

In 1992 BASF adopted yet another vision of the world community, the concept of sustainable development formulated at the 1992 United Nations environmental conference in Rio de Janeiro and officially agreed in Agenda 21. It states that every economic activity shall show due consideration to the economic, ecological, and social needs of society without impairing the developmental opportunities of succeeding generations. This principle is linked to the hope of converting potential damagers of the environment into efficient agents of environmental policy. The basic idea is simple. Practically all environmental impacts, aberrations, and shortcomings tend to be remediable through the resources, accumulated knowledge, and innovativeness of

⁷⁸⁷ BASF, *Gesellschaftliche Verantwortung 2000*, p. 44.

enterprises such as BASF if their economic activity is systematically oriented to ecological standards. This linkage will turn private enterprise's perpetual bid for increased value, solid market positions, and global presence into an "invisible hand" that will contribute to solving the most important environmental problems, meeting society's need for gainful employment and social stability, and satisfying the basic human needs for food, health, clothing, shelter, and communication. The key instrument for putting the idea of sustainability into business practice is ecological efficiency analysis, to which new or improved products are subjected. The goal is to intertwine ecological harmlessness and economic success as tightly as possible. Products and processes are to be compared across the entire product cycle – from extraction of the raw materials to the product's use or disposal – for ways to optimize the relationship between utility, environmental compatibility, and costs. Ideally, the ecologically efficient products and processes offer additional competitive benefit.

Since the 1990s, the strategy behind BASF's transnational expansion can be reduced to three objectives: strong market position, global presence, and expansion of the core business. First, far more than two-thirds of BASF's turnover and results are currently achieved in business units ranking among the top three in their markets. This business volume is required for the productive use of world-scale plants, in which the comparative advantages of BASF's corporate culture fully come to bear in the field of technology. Of course, markets with oligopolistic forms and structures, which almost inevitably give rise to this strategy, are not unproblematic when it comes to competition policy. Competition among the few always threatens to turn into monopolistic market structures, either because rivals are driven out or because cartels are formed. BASF experienced this reality at the turn of the twenty-first century, when antitrust authorities in the United States and the European Union heavily fined the company for price fixing on the vitamin market. The costs of this sanction were listed as "special influences" that substantially shrank the company's operating result.

Second, the call for global presence is based on the lesson that a single marketing strategy conceived from a single source is rarely appropriate on a worldwide scale. With this point in mind, the regionalization of siting policy appears logical. As the new century began, the share of BASF's tangible and intangible worldwide assets represented by Europe (€2.9 billion in 2000) fell below half (49 percent) for the first time. The corresponding figure represented by North America stagnated at 33 percent, whereas the Asian-Pacific region surged (14 percent, including Africa).

The third objective, the expansion of BASF's core business, is less straightforward than it may at first seem, for it is not altogether clear just where that business is presumed to be. For a long time, the learning process that decided this issue and gave rise to both the strategy of the 1990s and today's accompanying organizational structure was seldom predictable in its

results, not always intended, and by no means painless. In the end, BASF's corporate culture proved astonishingly resistant to the top management's basic will to change. Its institutions were deeply rooted in the thinking and behavior of the Anilines at all levels of the hierarchy and were rewarded and reinforced by the market and the policy-making community again and again. The scope for entrepreneurial decisions eventually narrowed to the point of path dependency. It took a long time for the managing board to see that it made little sense to pursue objectives whose realization required quick and thorough elimination of perennial weaknesses, as in the area of marketing.⁷⁸⁸

Far more successful strategies have been those building on the corporate culture's obvious strengths and setting what have seemed to be realistic and immediately achievable objectives for the Group.⁷⁸⁹ Since the late 1980s, when BASF began to follow this course by means of systematic portfolio management, the enterprise has sold off far more than 100 businesses that could not become "consistently profitable" organizations.⁷⁹⁰ The most prominent area of this kind was pharmaceuticals, which generated too few marketing and distribution synergies within the BASF Group. The years from 1992 through 2001 saw a slimming of the portfolio, too. Turnover fell by around €11 billion through "divestment," and only €9.5 billion came in through acquisitions. Classical areas of work such as textile dyestuffs and polyolefins were brought into joint ventures because the prospects for their future were enhanced above all through economies of scale.

Technological competence has constituted the heart of BASF's corporate culture since the beginning of the twentieth century. It still does. Pushing back this dominance of technology and making way for visions based on business economics – marketing and profit planning – has been the explicit goal of corporate policy since the early 1960s. Timm, who at about the same time declared the fully integrated production complex (the verbund) to be the new leitmotif of BASF technology, saw this technology as only one leg of the enterprise. He, too, believed that the matter of future survival would be decided on the consumer-oriented markets. Nearly everyone knowledgeable about market development agreed. The slogan was, therefore, forward integration. BASF seemed to have the wherewithal for it. It was one of the pioneers in the audiotape area and enjoyed high repute in the field of technology. For the manufacture of synthetic fibers, BASF itself had practically all the necessary primary products, which it was able to use at low cost thanks to its superior processes. The company seemed predestined for pharmaceuticals

⁷⁸⁸ "Vorstand fordert radikales Umdenken in der BASF," *Frankfurter Allgemeine Zeitung*, June 19, 2001.

⁷⁸⁹ Chairman of the managing board Jürgen Strube in an interview with Mark Milner, *The Guardian*, August 8, 2001.

⁷⁹⁰ BASF, Wertsteigerung durch Wachstum und Innovation, financial report, 2001, pp. 61–2.

because of its own success in fine chemicals. Yet none of the hopes that were attached to the forays into new, hitherto tabooed terrain were met.

The strategy of forward integration did have one lasting side effect, however. It helped transform BASF into a transnational company. Export-oriented from the start, the company was rather reticent about establishing production plants abroad and remained so into the 1960s. Unless the tariff or patent legislation of the target countries required BASF to have its own production facilities in the particular market there, the company preferred serving the world markets from its fully integrated home-base production complex in Ludwigshafen. This attitude fundamentally changed with the strategy of forward integration, which made it necessary to know the lead market in order to gain an edge in developing innovative designs. For most of BASF's consumer products, these initiatives came from the U.S. market, so North America, not the EEC, became BASF's most important foreign production site. The breakthrough occurred there in the mid-1980s through spectacular acquisitions, but in those cases, too, it was BASF's constant development of basic chemistry that made the company one of the chief actors on the North American chemical market.

The Road to New Industry: Old Industry or “New Economy”?

The rise of basic chemistry to the principal position it holds in the world today was long overshadowed by consumer products. It occurred quite undramatically and inevitably but at a surprisingly steady pace once BASF had joined the petrochemical revolution. Although the era of major technical syntheses was past and technology had seemed to recede as the vision for chemistry, BASF again found the kind of market access that was in keeping with its corporate culture. If one were to seek a symbolic expression of the company's significance to today's chemical industry, it would undoubtedly be the verbund, the fully integrated production complex with a streamcracker at its center. No other enterprise has been able to bring this system to a similar state of perfection in chemistry.

Seen from the lens of the 1960s, one of the intentions behind adopting the strategy of forward integration was to circumvent the aging process in the life cycle of the chemical industry. The notion that the new industry of the late nineteenth century could become the old economy of the twenty-first century is still prevalent today.⁷⁹¹ But it imposes an extremely narrow definition of what it is specifically that characterizes the ascendancy of the new economy at the dawn of this century. If the quintessence of the new production method is not to be confined to information technology – as conspicuous as its dynamics are at the forefront of this development – then more general criteria have to

⁷⁹¹ “BASF: Nun bricht auch die Old Economy ein, *Manager Magazin*, June 21, 2001.

be found in order to distinguish old from new. One must move beyond the classical three-sector hypothesis, which describes the sectorial dynamics of the economy as a whole – from agricultural activity and value creation to the material production of industrial society to the intangible economic foundations of the service society. Empirical economic research showed long ago that the most dynamic growth, even in the industrial sector, is found in intangible activity and value creation. Functionally speaking, more than three-quarters of the value creation in the overall economies of postindustrial nations such as the United States and Germany is grounded in intangible activity.⁷⁹²

These findings illustrate that the aging process of industries is not essentially a matter of the sector to which they belong but rather of their ability to root a growing share of their value creation in intangible production processes. Science and knowledge as factors of production thereby acquire the greatest significance as the engine of research and development. In this sense the basic idea of new industry in the nineteenth century long ago ensured the survival of the traditional old industries in which it won out. The chemical industry is among the pioneers of this transformation process, which placed the economy as a whole on a new footing in the twentieth century. Its leading enterprises embody this process in all its perfection. BASF exemplifies this development. The occupational characteristics of its employees shifted during the twentieth century more and more to intangible work. Scientific research and development are integral to what they do. The verbund system – that calculated configuration of intricately interlocking production programs and technical infrastructures that creates and marshals the synergies of different human and material resources – paved the way for a constant flow of innovative combinations. As early as the 1960s, BASF was one of the least material-intensive producers of the chemical industry and had the highest rate of intangible value creation and processing of the companies that succeeded IG Farben – thanks in part to this highly advanced production structure.⁷⁹³

⁷⁹² "Das Dienstleistungs-Puzzle. Ein aktualisierter deutsch-amerikanischer Vergleich," *DIW-Wochenbericht*, 35 (1998), 625–9.

⁷⁹³ BASF, Volkswirtschaftliche Abteilung [Department of Political Economy], Comparison of short-term development: BASF, Bayer, Hoechst, May 1964, p. 6; BASF UA, B4–981.

Appendix

Trade Volume and Profits of BASF since its Founding in 1865

Table A.1. *Badische Anilin- & Soda-Fabrik AG, 1865–1924 (in Millions of Marks and Reichsmarks)*

Year ^a	Turnover ^b	Profit	Year ^a	Turnover ^b	Profit
1865–66	1,049	149	1896	31,050	5,866
1867	1,493	175	1897	33,262	5,563
1868	2,145	296	1898	34,256	5,806
1869	3,037	440	1899	36,957	6,204
1870	3,221	419	1900	39,679	6,106
1871	3,230	566	1901	44,150	6,090
1872 ^c	4,484	847	1902	50,670	6,988
1873 ^d	8,626	2,003	1903	51,496	7,013
1874	11,194	1,971	1904	51,112	6,291
1875	12,516	1,283	1905	70,801	7,326
1876	12,160	1,283	1906	77,980	7,922
1877	12,392	1,726	1907	83,631	8,013
1878	13,970	2,722	1908	82,004	7,571
1879	15,411	4,396	1909	94,980	10,535
1880	16,876	3,319	1910	97,534	10,792
1881	17,855	4,750	1911	105,189	12,397
1882	21,680	5,783	1912	114,164	15,165
1883	19,096	3,921	1913	120,676	15,178
1884	18,189	3,261	1914	112,911	13,562
1885	17,528	2,658	1915	122,421	17,201
1886	18,211	3,331	1916 ^e	179,227	23,549
1887	19,390	3,708	1917 ^e	258,511	30,001
1888	21,012	3,597	1918 ^e	330,635	10,848
1889	23,156	4,549	1919 ^e	333,499	27,025
1890	25,084	5,009	1920 ^e	2,770,299	65,184
1891	27,479	4,978	1921 ^e	4,452,013	165,262
1892	28,867	6,384	1922 ^f	265,796	^g

(Cont.)

Table A.1. (Cont.)

Year ^a	Turnover ^b	Profit	Year ^a	Turnover ^b	Profit
1893	27,714	6,171	1923 ^f	249,612	^g
1894	28,525	5,713	1924	429,297	14,880
1895	31,795	6,004			

^a July 1–June 30.^b Including subsidiaries and associated companies.^c July 1–December 31, 1872 = 2,289.^d Merger with the two companies Knosp and Siegle.^e Distortions due to inflation.^f In gold marks.^g No earnings reported for 1922 and 1923.

Source: Umsätze und Gewinne der BASF seit der Gründung 1865 [Sales and Profits of BASF since its Founding in 1865]; BASF UA, C 433.

Table A.2. *Ludwigshafen and Oppau Factories of IG Farbenindustrie AG, 1925–45^a (in Millions of Reichsmarks)*

Year ^b	Turnover	Profit	Year ^b	Turnover	Profit
1925	358,548	^c	1936	260,186	-1,838
1926	371,309	^c	1937	320,162	2,815
1927	243,871	^c	1938	395,451	7,463
1928	290,593	^c	1939	468,480	18,411
1929	244,075	^c	1940	519,036	16,925
1930	204,647	^c	1941	596,845	19,988
1931	187,650	-3,890	1942	666,399	25,142
1932	146,029	-5,702	1943	756,169	26,370
1933	153,519	-6,942	1944	675,632	27,594
1934	180,331	-3,842	1945	219,899	-21,406
1935	202,131	-1,843			

^a Estimated figures from the Ludwigshafen and Oppau factories, without Leuna.^b July 1–June 30.^c No earnings reported for 1925 through 1930.

Source: Umsätze und Gewinne der BASF seit der Gründung 1865 [Sales and Profits of BASF since its Founding in 1865]; BASF UA, C 433.

Table A.3. *Badische Anilin- & Soda-Fabrik AG, 1946–1951 (IG Farbenindustrie Aktiengesellschaft “in Liquidation”) in Millions of Reichsmarks (RM) and Deutsche Marks (DM)*

Year ^a	Turnover	Profit	Year ^a	Turnover	Profit
1946	134,221	-42,628	1949 ^c	261,700	-56,917
1947	191,910	21,296	1950	485,641	12,128
1948 ^b	258,800	-36,228	1951	678,665	38,260

^a July 1–June 30.

^b Estimate; January 1–June 20, 1948 = RM 116,561 million.

^c Estimate; June 21, 1948 through December 31, 1949 = DM 406,062 million.

Source: Umsätze und Gewinne der BASF seit der Gründung 1865 [Sales and Profits of BASF since its Founding in 1865]; BASF UA, C 433.

Table A.4. *Badische Anilin- & Soda-Fabrik AG, 1952–1992 (as of 1973 BASF AG), in Millions of Deutsche Marks (DM)*

Year	Turnover BASF AG	Turnover BASF Group ^a	Profit BASF AG	Profit BASF Group
1952	661 ^b		008	
1953	885 ^b		023 ^c	
1954	1,050 ^b		027 ^c	
1955	1,261 ^b		038 ^c	
1956	1,498 ^d		051 ^c	
1957	1,800 ^d		062 ^c	
1958	1,930 ^d		088 ^c	
1959	2,268 ^d		148 ^e	
1960	2,588 ^d		162	
1961	2,597 ^d		152	
1962	2,856 ^d		185	
1963	3,179 ^d		197	
1964	3,031	3,755	240	
1965	3,261	4,050	283	
1966	3,644	4,707	247	
1967	3,517	4,674	260	250
1968	4,057	5,580	338	330
1969	4,516	8,892	354	401
1970	4,860	9,583	307	268
1971	5,200	10,233	229	287
1972	5,921	11,861	277	408

(Cont.)

Table A.4. (Cont.)

Year	Turnover BASF AG	Turnover BASF Group ^a	Profit BASF AG	Profit BASF Group
1973	6,905	14,258	301	514
1974	10,157	19,736	259	519
1975	8,394	18,081	273	375
1976	9,798	20,983	356	607
1977	9,632	21,150	281	388
1978	9,680	21,513	271	421
1979	12,134	25,896	405	619
1980	12,491	27,731	330	359
1981	14,184	31,766	325	367
1982	14,954	32,486	236	275
1983	16,937	35,111	390	517
1984	19,809	40,400	555	895
1985	20,461	44,377	646	998
1986	18,717	40,471	710	910
1987	18,547	40,238	820	1,051
1988	20,707	43,868	1,184	1,410
1989	22,284	47,617	1,398	2,015
1990	21,612	46,623	1,041	1,107
1991	20,404	46,626	884	1,039
1992	18,560	41,933 ^f	770	615
1993	17,423	40,568 ^g	668	858
1994	19,257	43,674 ^h	910	1,284
1995	21,061	46,229	1,354	2,471
1996	20,607	48,776	1,701	2,790
1997	23,527	55,780	1,844	3,236
1998	21,045	54,065	2,101	3,324
1999	21,229	57,644	1,970	2,419
2000	25,535	70,304	2,474	2,425

^a Net turnover as of 1967.^b Not including subsidiaries and associated companies.^c "Net profit" (net income for the year minus allocations to the free reserve funds).^d Including subsidiaries and associated companies.^e Net income for the year.^f With DM 44,522 in tax on crude oil and natural gas.^g With DM 43,123 in tax on crude oil and natural gas.^h With DM 46,565 in tax on crude oil and natural gas.

Source: Umsätze und Gewinne der BASF seit der Gründung 1865 [Sales and Profits of BASF since its Founding in 1865]; BASF UA, C 433.

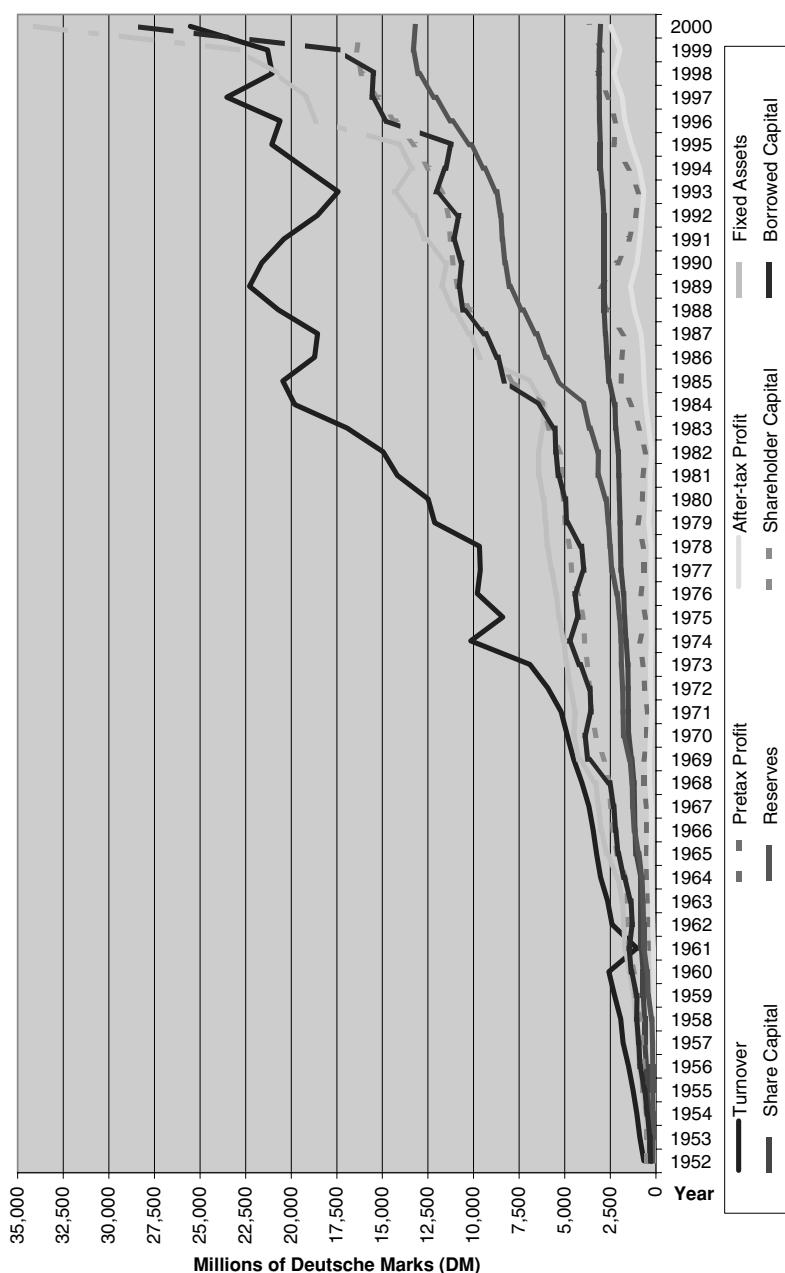


Figure A.1. Development of BASF AG, 1952–1990.

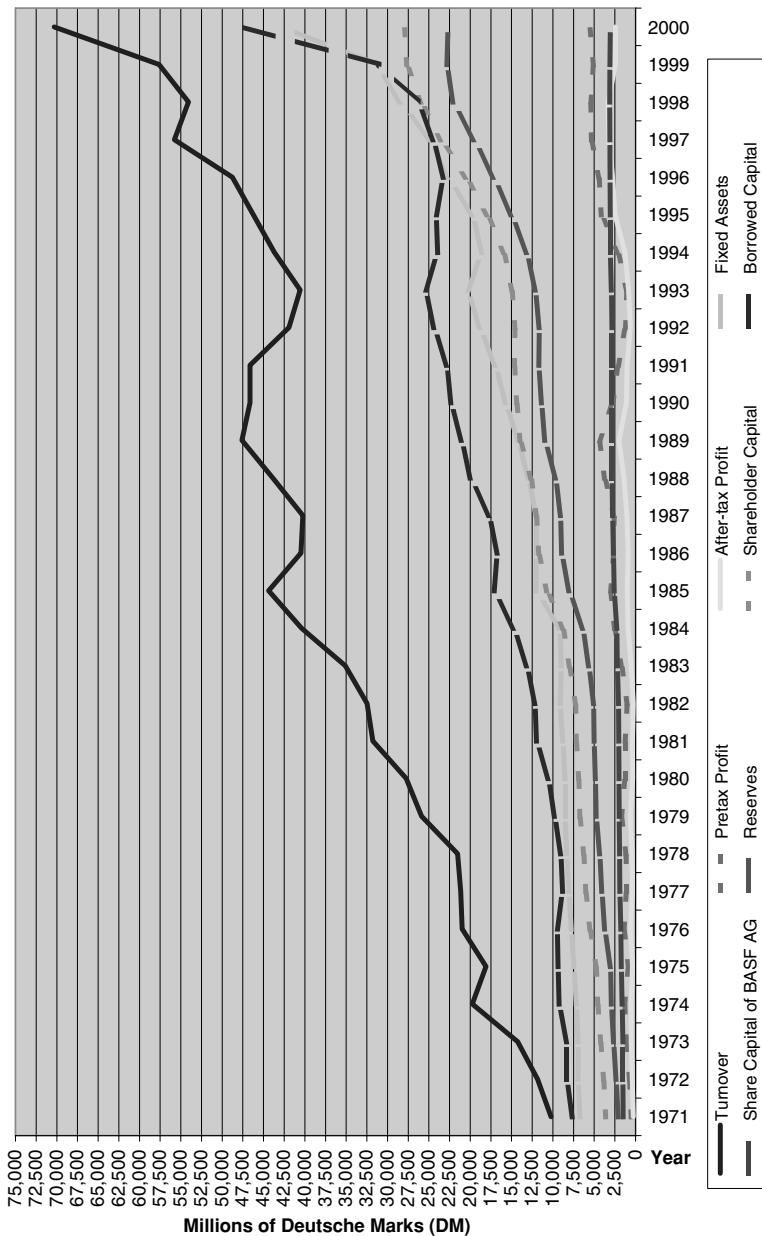


Figure A.2. Development of the BASF Group, 1971–2000.

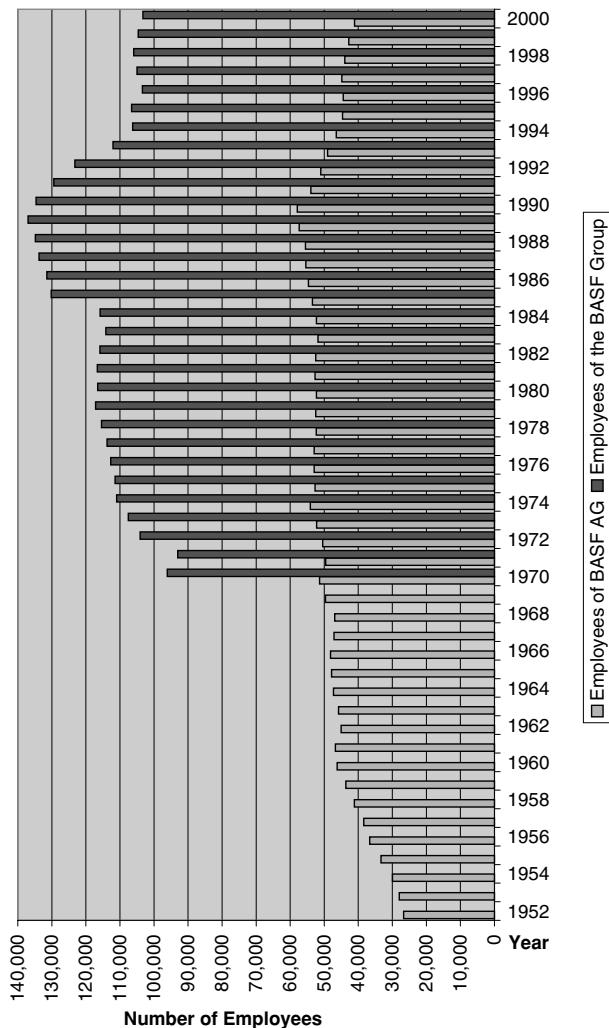


Figure A.3. Comparison of the payrolls of BASF AG and the BASF Group.

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Index of Archives

BASF IG	IG Farben Archive in the BASF corporate archive, Ludwigshafen, Germany
BASF RA	BASF Rechtsabteilung [Legal Department], Ludwigshafen, Germany
BASF UA	BASF Unternehmensarchiv [Corporate Archive], Ludwigshafen, Germany
BAK	Bundesarchiv [German Federal Archive], Koblenz, Germany
BAL	Bundesarchiv [German Federal Archive], Berlin-Lichterfelde, Germany
BAMA	Bundesarchiv – Militärarchiv [German Federal Archive – Military archive], Freiburg, Germany
BAP	Bundesarchiv [German Federal Archive], formerly the Potsdam collection, Berlin, Germany
Bayer	Bayer Werksarchiv [Bayer Factory Archive], Leverkusen, Germany
BP ARC	B[ritish] P[etroleum] Amoco Archive in Modern Record Centre, University of Warwick, United Kingdom
EFP	Emil Fischer Papers, Bancroft Library, University of California at Berkeley, California
GARF	Archive of the Russian Federation, Moscow
GLA	General Landesarchiv [General <i>Land</i> Archive] Ludwigshafen, Germany
Hoechst	Hoechst Archive, Frankfurt-Höchst, Germany
IWM	Imperial War Museum, London
LAM	Landesarchiv [<i>Land</i> Archive], Merseburg, Saxony-Anhalt, Germany
MGFrC	Archive of the French Military Government in Germany, Colmar, France
NA	National Archives, College Park, Maryland
NI	Records of the U.S. Nuremberg War Crimes Trials: NI Series, 1933–1948, U.S. National Archives, Record Group 238, Microfilm T 301
PAT	Privatarchiv of Dr. Bernhard D. Timm, Torquay, United Kingdom
PRO	Public Record Office, Kew, London
USHMM	U.S. Holocaust Memorial Museum, Washington, D.C.
WWA	Wirtschaftsarchiv des Instituts für Weltwirtschaft [Economic Archive of the Institute for the World Economy], Kiel, Germany
SALU	Stadtarchiv [Municipal Archive] Ludwigshafen, Germany
UAM	Unternehmensarchiv [Corporate Archive] McKinsey & Company, Düsseldorf, Germany

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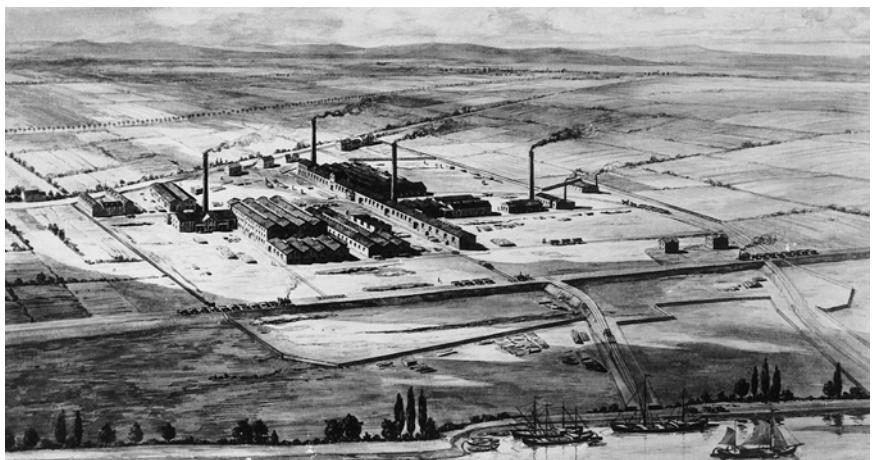
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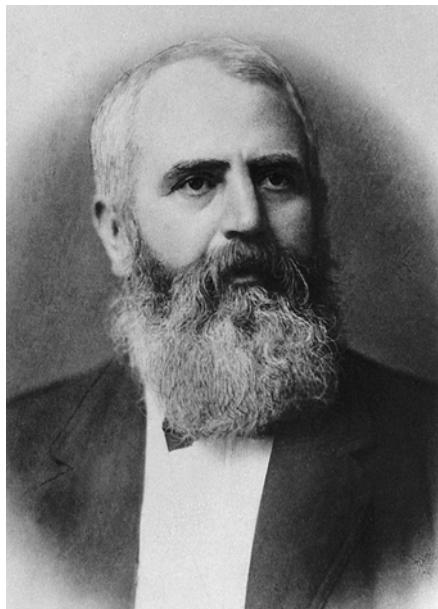
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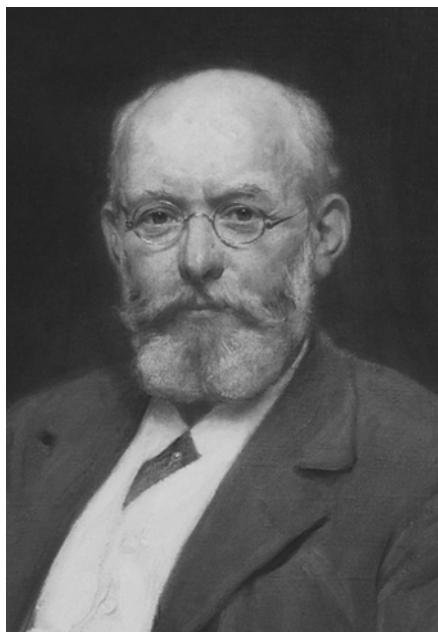
The first “view of the BASF factory” at Ludwigshafen, ca. 1866 (Painting by Otto Bollhagen)



The Ludwigshafen works in 1881 (Painting by Robert Friedrich Stieler)



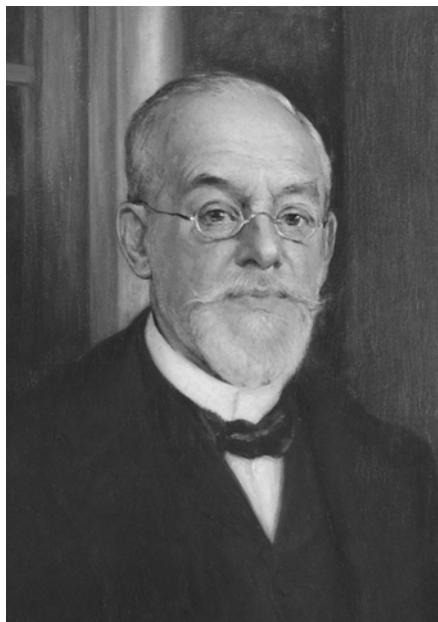
Friedrich Engelhorn (1821–1902)



Carl Clemm (1836–1899)



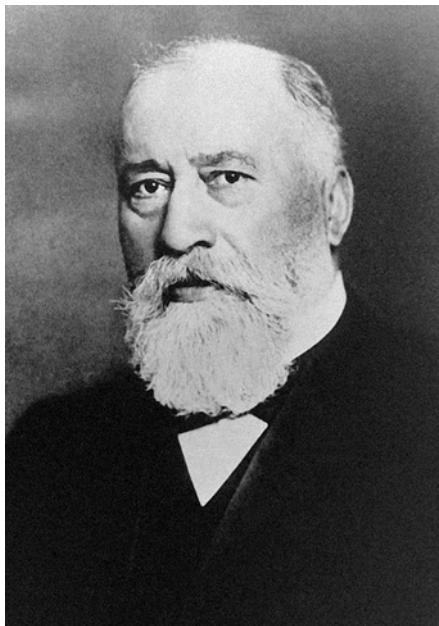
Seligmann Ladenburg (1797–1873)



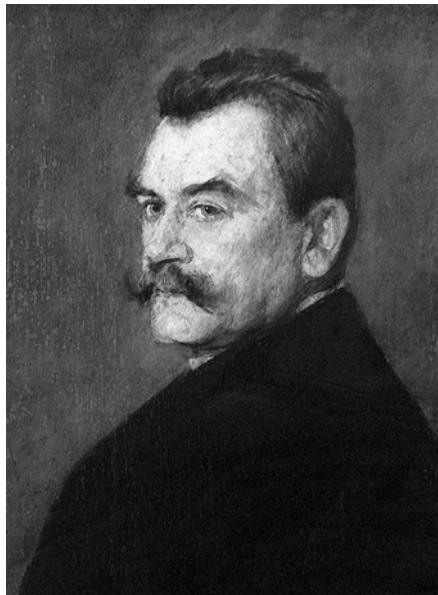
August Clemm (1837–1910)



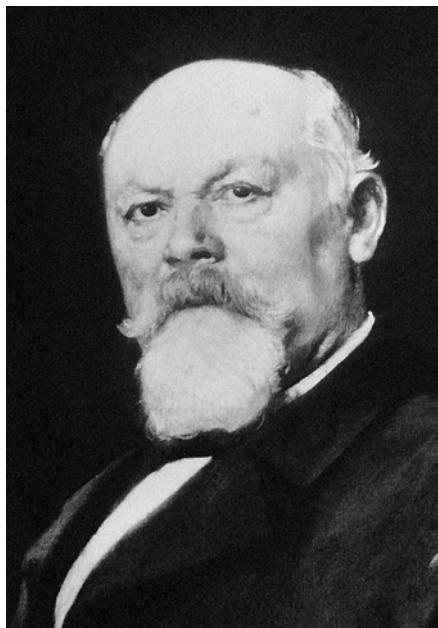
Carl Glaser (1841–1935)



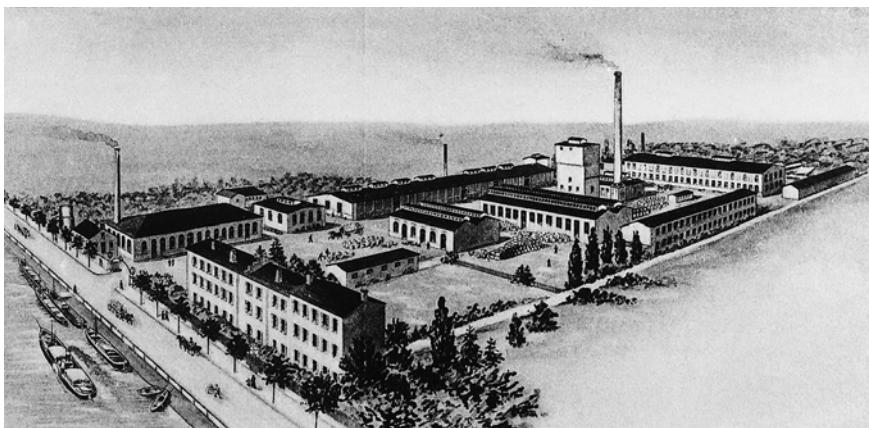
Heinrich Brunck (1847–1911)



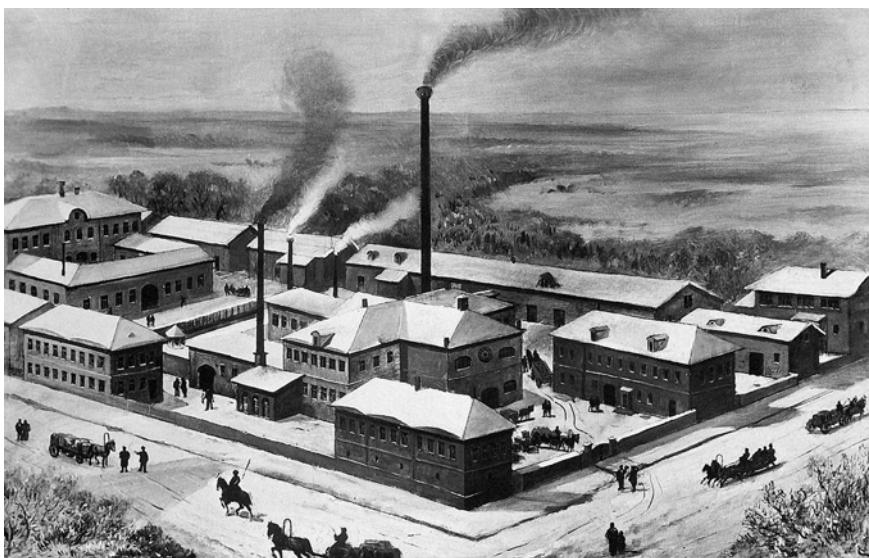
Gustav Siegle (1840–1905)



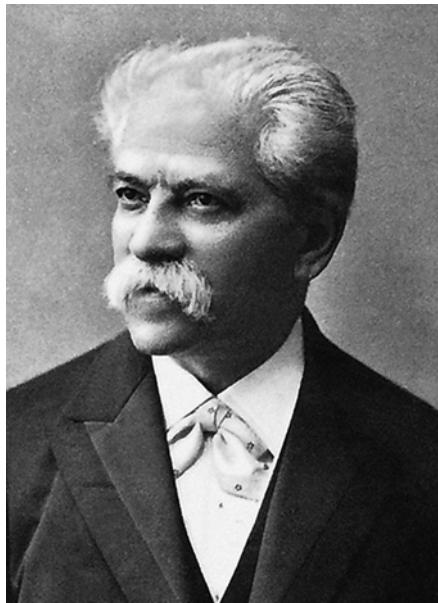
Rudolf Knosp (1820–1897)



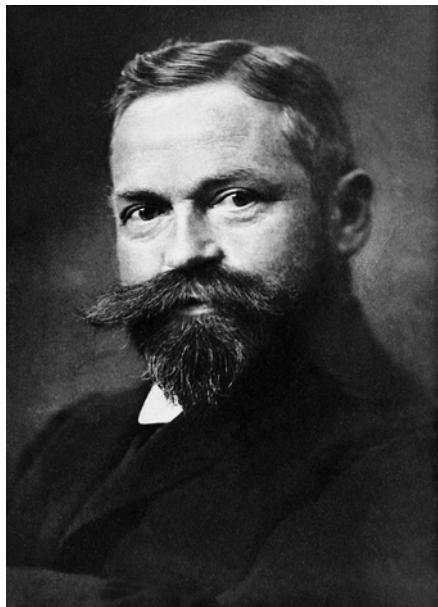
Starting in 1872, BASF cooperated in France with the firm of Thomas Brothers in Avignon in the manufacture and sale of alizarin dyes. In 1878, BASF took over the operation of the factory in Neuville sur Saône under its own direction.



In Russia, BASF founded a sales agency in 1874 only to open its own production premises in Butirki near Moscow four years later.



Heinrich Caro (1834–1910)



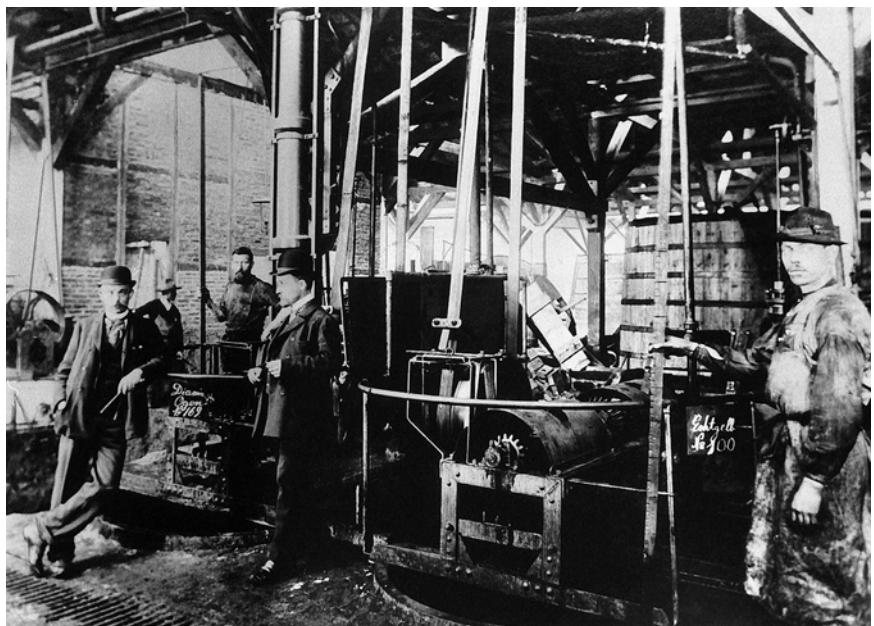
Rudolf Knietsch (1854–1906)



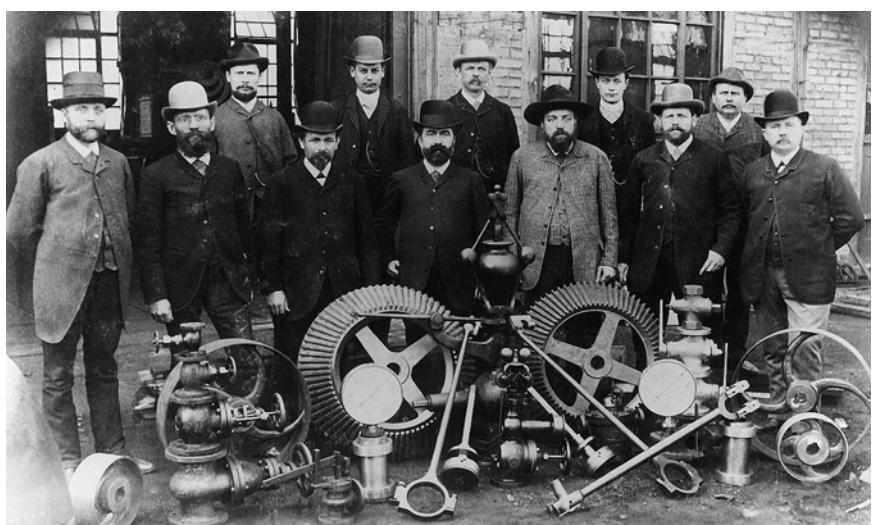
Paul Julius (1862–1931)



René Bohn (1862–1922)



The manufacture of azo dyestuffs (ca. 1895)



Master craftsmen in a metalworking workshop (ca. 1892)



UF GRUND DER ANGEHEFTETEN BESCHREIBUNG IST DURCH BESCHLUSS
DES KAISERLICHEN PATENTAMTES

an die Badische Anilin- und Soda-
fabrik in Ludwigshafen a. Rh.

EIN PATENT ERTHEILT WORDEN.

GEGENSTAND DES PATENTES IST:

GESETZ v. 25. MAI 1877

Verfahren zur Darstellung künstlichen Indigos.

ANFANG DES PATENTES: 6. Mai 1890.

DIE RECHTE UND PFlichtEN DES PATENT-INHABERS SIND DURCH DAS PATENT-GESETZ
VOM 25. MAI 1877 (REICHSGESETZBLATT FÜR 1877 SEITE 601) BESTIMMT.

ZU URKUND DER ERTHEILUNG DES PATENTES IST DIESE AUSFERTIGUNG
ERFOLGT.

Berlin, den 19. November 1890.

KAISERLICHES PATENTAMT.

Beglubigt durch *Frank*,

Bureau-Vorsteher des Kaiserlichen Patentamtes.

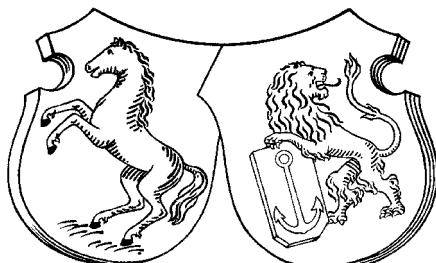
Wegen der Patenztücher ist die zweite und letzte Seite dieser Urkunde zu beachten!

F. 2.

Patent certificate for artificial indigo dye: After 17 years of intensive research, BASF brought synthetic "Indigo Pure BASF" onto the market in 1897. The decisive patent that led to the synthesis of indigo was issued in 1890.



Labels for dyes were especially important for the marketing of dyes abroad. The magnificent motifs printed on the glassine (artificial parchment) paper that wrapped the tin cans in which the dyes were sold served to identify the product, especially since many of the end users in export countries could not read.



The Stuttgart horse and the official seal of Ludwigshafen (an upright Bavarian lion holding a shield with an anchor) festoons the first firm trademark of BASF. The trademark was created after the fusion with the Stuttgart-based firm of Siegle and Knosp in 1873.



The “BASF egg” was registered as a trademark starting in 1922, but was only used for fertilizers. Until the end of the Second World War, it remained in its original form. Starting in 1955, it was divided into four rather than two fields, with a garland of corn surrounding the bottom half.



In 1952, the traditional trademarks of BASF, the horse and the lion, registered in a slightly revised form. The novelty was the letters BASF in the crown above the two shields as well as the date 1865. This trademark was used into the 1960s.

BASF

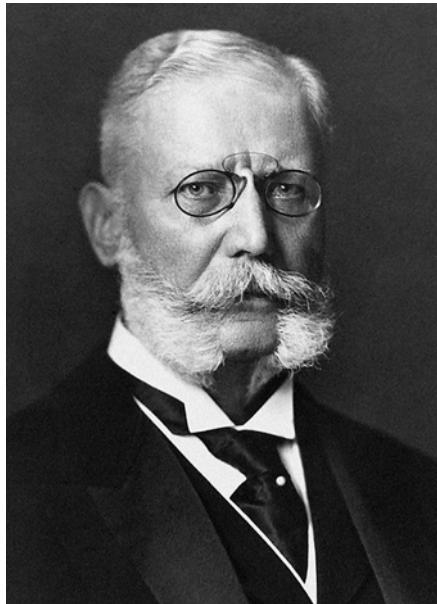
Just one year later, BASF developed a new trademark, consisting of four thin hollow-block letters. It was used for the first time in the report about the refounding of the firm.

A black rectangular box containing the word "BASF" in a white, bold, hollow-block font.

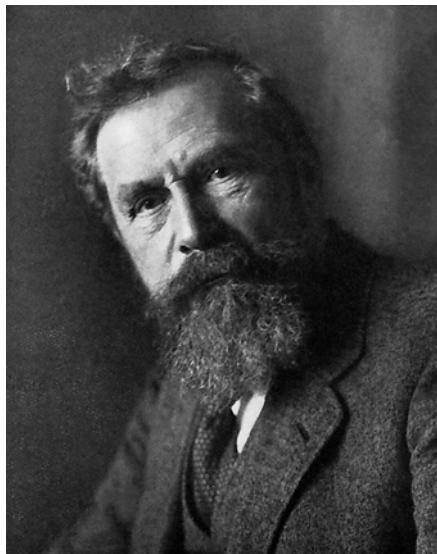
This trademark, used beginning in 1967, was designated as a "briquette" and shows the four letters—now negative and in normal writing—on a black block.

BASF

Beginning in 1968 there were deliberations about getting rid of the "signature of the founding period." In 1973, Badische Anilin- & Soda-Fabrik AG officially changed its name to BASF Aktiengesellschaft. In the interest of corporate identity and corporate design, a new firm trademark has been used uniformly throughout the BASF group as a whole.



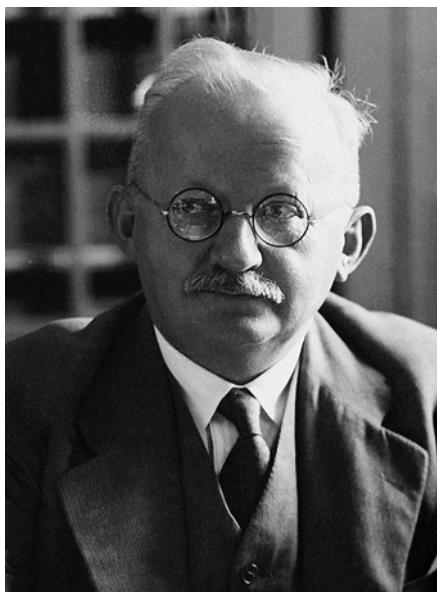
Robert Hüttenmüller (1853–1919)



Carl Ludwig Müller (1857–1931)



Carl Bosch (1874–1940)



Alwin Mittasch (1869–1953)



The social building (Gesellschaftshaus) was turned over by BASF to its high-ranking salaried officials at the end of 1900. It featured work areas, a dining room that could accommodate 250 guests, sleeping accommodation for its personnel, as well as a number of rooms for relaxing and for socializing, a large ballroom, a billiards room and a bowing alley. For the waged workforce, there was a library with reading room.



The house for clubs and associations (Feierabendhaus, or leisure building) was opened up in 1913 with the purpose of serving as a meeting place for the (firm-loyal) workingmen's association as well as for BASF factory clubs and associations. Since public events also took place here, it became a cultural and social focal point of BASF.



The Oppau works after the explosion of September 21, 1921. In the foreground, where building number Op 110 (a storage area for ammonium sulphate saltpeter) once stood and where the epicenter of the explosion lay, an enormous crater (25 meters long, 90 meters wide, and 20 meters deep) opened up. Nearly all of the Oppau works' buildings were damaged.



The village of Oppau was hardest hit, with 80 percent of the buildings destroyed or uninhabitable.



A view into the indigo laboratory in building Lu 260 (later C 300), ca. 1900. In the foreground (second from left), Rudolf Knietsch.



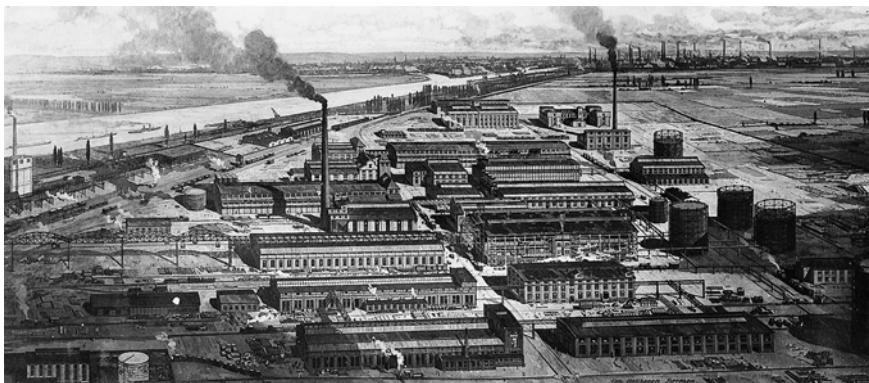
The workroom of the Main laboratory in building Lu 40 (later C 13), ca. 1921/22.



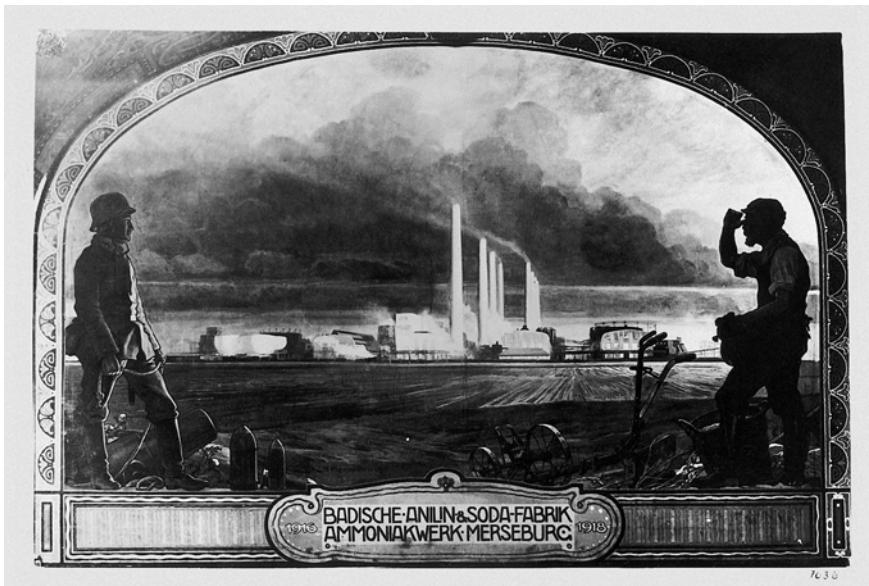
A view of the workers' housing in the Hemshof (1911). In the background, the plants and administrative buildings of BASF.



A supervisor's house in the Hemshof (around the turn of the twentieth century).



The Oppau works (Painting by Otto Bollhagen, 1914)



The Leuna works in Merseburg (Painting by Fritz Bersch, 1918). The allegorical figures of the farmer and the soldier symbolize the ambivalence of ammoniac, which is used for both fertilizer and for munitions.



Apparatus in the indigo factory in building Lu 279 around the turn of the twentieth century: The viewing ports on the apparatus are an indication of just how far technology advanced between the first technical synthesis of indigo and the chemical high-pressure technology of ammoniac synthesis shown in the next illustration.



The double pipe developed by Carl Bosch, which featured a feed pipe surrounded by a steel casing, withstood violent pressures and high temperatures during numerous experiments.



Martin Müller-Cunradi (1892–1945)



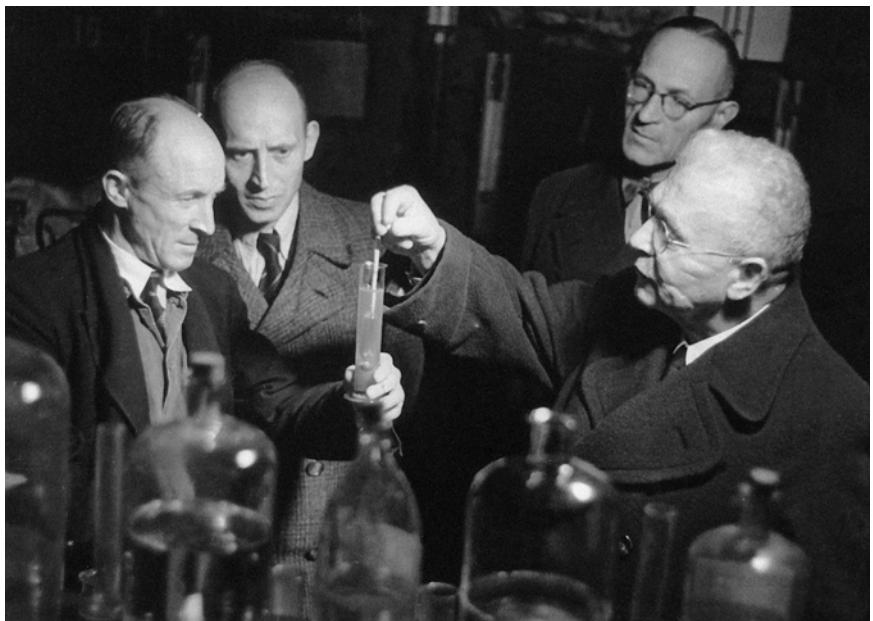
August von Knieriem (1887–1978)



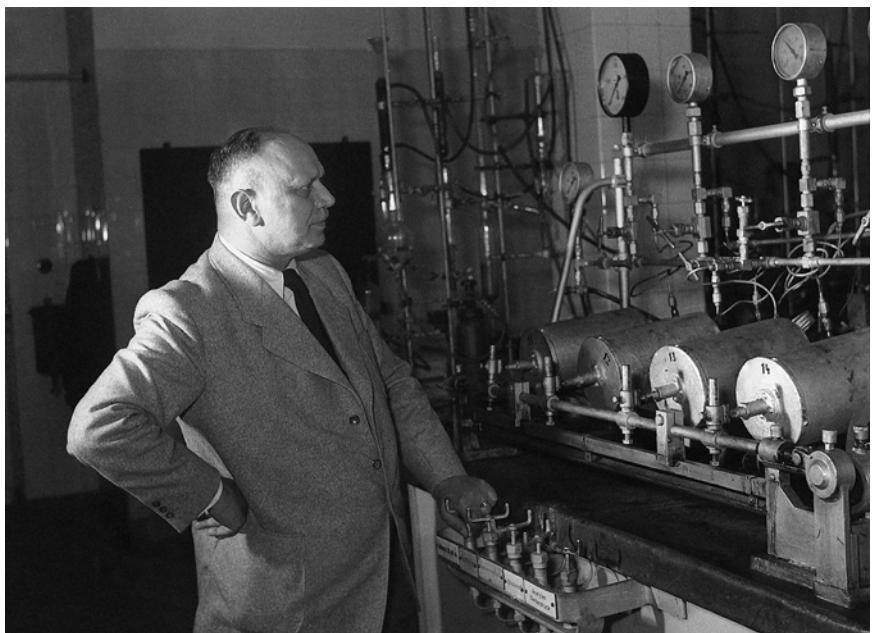
Carl Wurster (1900–1974)



Otto Ambros (1901–1990)



On the right, Matthias Pier (1882–1965)



Walter Reppe (1892–1969)



A zeppelin airship over BASF in 1930. In the foreground lies the "Neckarspitze," where the Neckar and Rhine Rivers flow together.



The aerial war: a flying fortress of the 8th U.S. Army Air Force over the Ludwigshafen works on September 13, 1944.



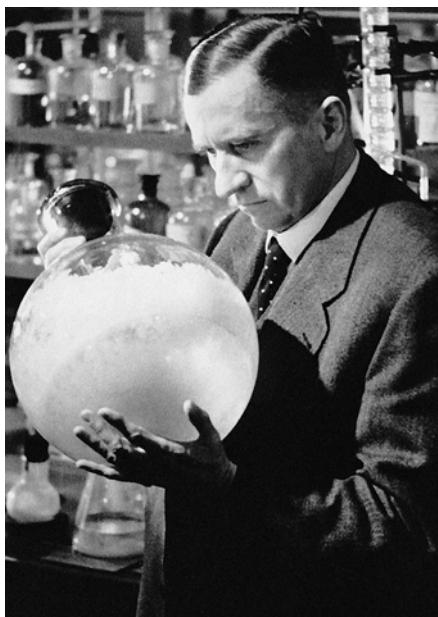
The I.G. Farben Office Building in Frankfurt am Main. The concern's headquarters was built according to designs by the architect Hans Poelzig.



Some of the accused in the I.G. Farben Trial at Nuremberg. From among the 23 accused, those shown here are, from left to right: August von Knieriem, Fritz ter Meer, Christian Schneider, and Otto Ambros.



Beginning in 1933, the first of May was designated the “Day of National Labor,” featuring a large parade of all members of the factories workforce. The illustration here is from 1935.



Carl Krauch (1887–1968, here in 1944). Krauch was a member of the I.G. Farben managing board between 1933 and 1938 before becoming “Plenipotentiary-general for special questions related to the chemical industry” in the National Socialist Four Year Plan organization. In 1940, he succeeded Carl Bosch as the chairman of the I.G. supervisory board. He was found guilty in the I.G. Farben Trial at Nuremberg in 1948 of use of slave labor.



Bernhard Timm (1909–1992)



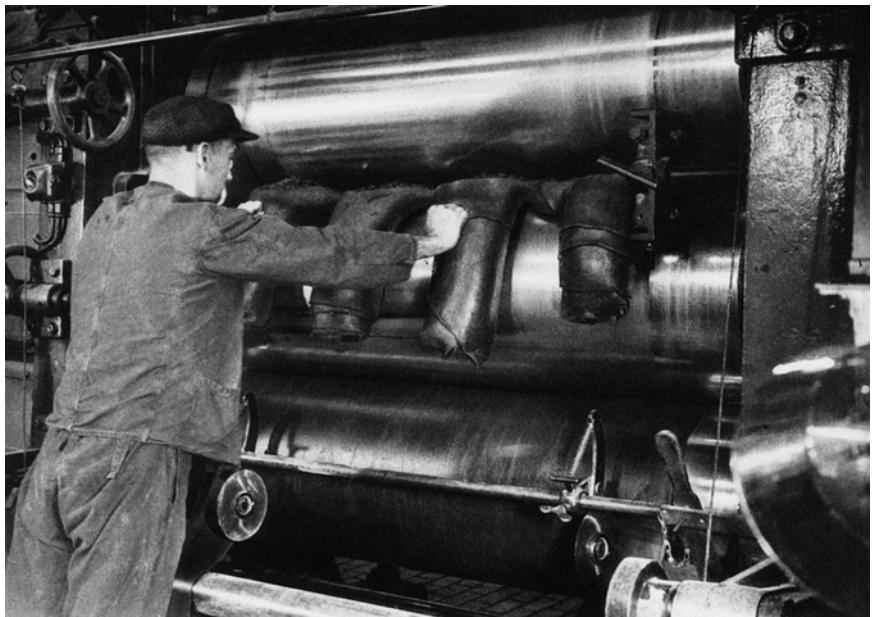
The new I.G. Farben Auschwitz works in Monowitz was supposed to resuscitate the previous close links between the Leuna works and the original BASF factories on the Rhine. Through this caricature, produced in 1941 on the occasion of an anniversary celebration of Leuna's founding, technical personnel of I.G. Farben demonstrated the willingness of leading men on all sides to work shoulder-to-shoulder with one another on this great project. Among them are Otto Ambros (second from left), Fritz ter Meer (third from left), and Martin Müller-Cunradi (far right).



Forced laborers in Monowitz (May 1944).



At the end of 1927, the first tank car laden with gasoline produced from coal departed the Leuna works. The fuel was sold under the name of "Leuna gasoline." Starting in 1936, the Leuna customer service was available to drivers at the white and red Leuna gas pumps. The service gave advice concerning reduction of, and also did tests to measure, fuel consumption.



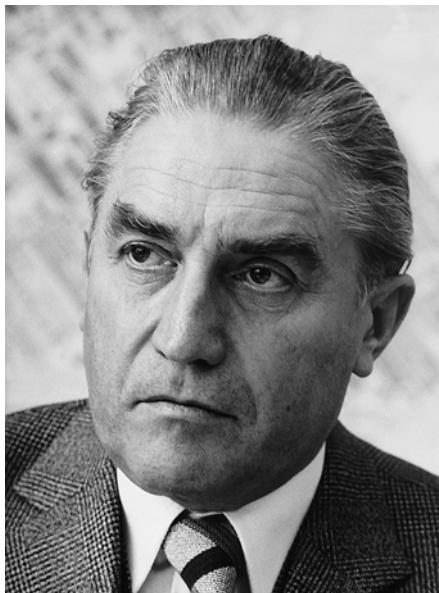
In 1930, the trademark of "buna" was registered at the German Imperial Patent Office, and the production of synthetic rubber from coal rose dramatically under the National Socialist regime, especially during the latter part of the decade. The picture illustrates the manufacture of a conveyor belt from buna. (1936)



It was not long after the start of the war that the first air raids hit the Ludwigshafen and Oppau works. The main focus of the attacks was, however, initially the civilian population in Ludwigshafen and nearby Mannheim. After 1943, production was affected to a greater and greater degree through carpet-bombing. In all, 40,000 bombs destroyed a third of all factory buildings completely, while the remainder was heavily damaged.



The explosion of a railroad tank car in July 1948 marked a major setback in the reconstruction of the Ludwigshafen complex. The accident took over 200 lives and destroyed many recently constructed buildings.



Matthias Seefelder (1920–2001)



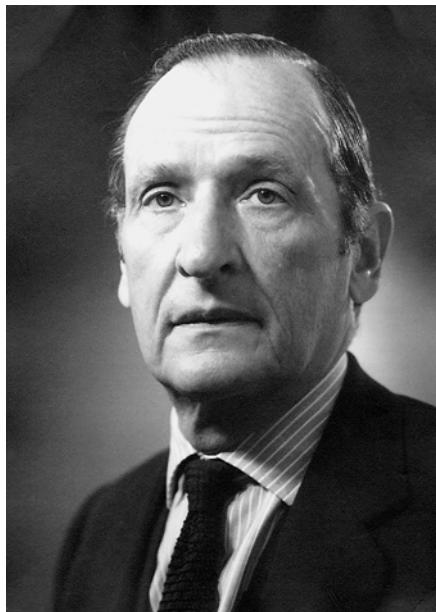
Hans Albers (1925–1999)



Jürgen Friedrich Strube (b. 1939)



Wolfgang Heintzeler (1908–1990)



Rolf Magener (1910–2000)



Willi Danz (b. 1912)



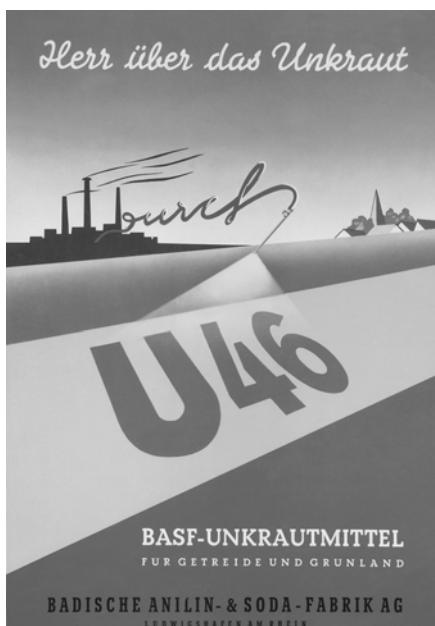
Horst Pommer (1919–1987)



Hermann Josef Abs, co-founder of the “new” BASF and member of the supervisory board of BASF AG between 1953 and 1970 (until 1965 as chairman).



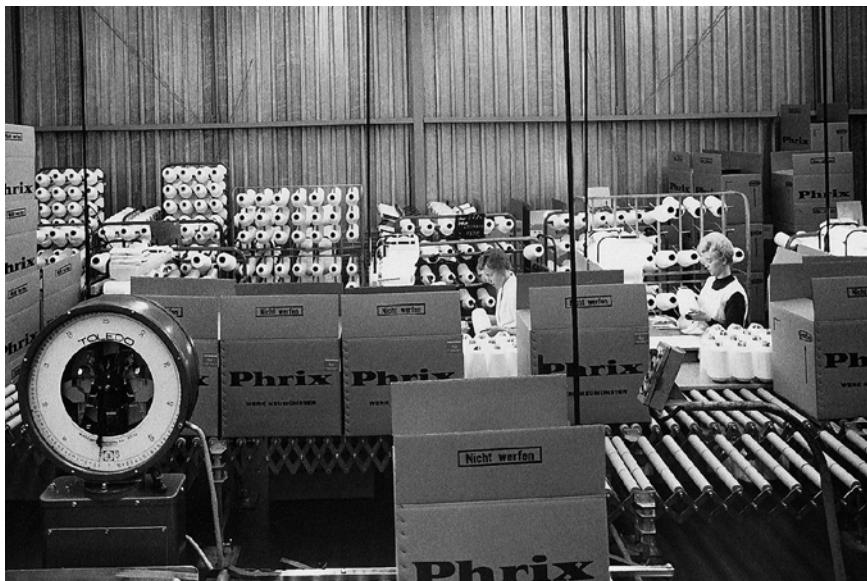
Ernst Lorenz, Chairman of the Works Council (1945–1964) and member of the supervisory board of BASF AG between 1953 and 1964.



With the weed killer "U 46," BASF entered an entirely new field of production in 1949. U 46 found a use as a selective herbicide, primarily in grain cultivation.



In December 1980, BASF Ludwigshafen put its second steam cracker into operation. Here, raw gasoline, or naphtha, is "cracked" with the aid of steam and at temperatures of 850 degrees centigrade to produce the feedstocks ethylene and propylene. Besides the two crackers in Ludwigshafen, BASF operates one steam cracker each in its Verbund sites in Antwerpen and in Port Arthur, Texas. The latter supplies factory sites in Geismar and Freeport.



The collapse of the BASF subsidiary, Phrix AG, drew considerable public attention. Many – and not just those in the workforce – protested the shutdown of the largest part of the company, as shown here in Hamburg in 1970. The lower photograph is courtesy of SV-Bilderdienst.



By 1959, 25 years after the first 50,000 meters of "BASF Magnetophone Tape" was delivered, BASF was able to offer a broad assortment of magnetic tape products in all specialist outlets. Since the end of the 1970s, growing competition from Asia and the United States has put enormous pressure on BASF's presence in this area.

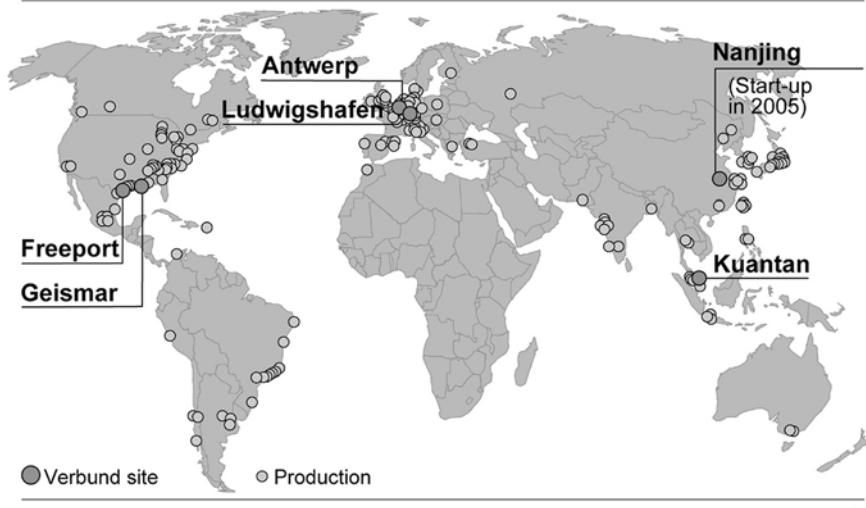


"BASF-Inside," an exhibition of consumer articles produced using BASF plastics, which took place in 1960 in the applications technology section.



Foamed polystyrene conquered the markets under the trade name Styropor in the 1950s. Styropor not only developed into a big seller, it also paved the way for BASF's first foreign production rights. Styropor enjoys excellent insulating properties and in spite of its light weight is highly durable, as this photo illustrates.

The Verbund: Global presence



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The BASF Group today consists of its nucleus, BASF AG, and more than 100 subsidiaries and companies in which BASF has a financial interest worldwide. In Ludwigshafen, BASF AG operates one of the largest chemical complexes in the world. Further "Verbund" sites are Antwerpen in Belgium, Geismar and Freeport in the United States, and Kuantan in Malaysia. A new Verbund site is due to come into operation in Nanjing, China, in 2005.