

rotatory dispersion. There were two in 1960 and four in 1961. Biological aging had four in 1960 and one in 1961. Organic conductors of electricity had one in 1960 and none in 1961. However, it's quite probable that by 1962 there will be more reviews in these areas. At the same time, though, other new subject areas will need reviews.

There will always be a need for review papers in new fields of interest, but we should not overlook the fact that there are already many reviews available. The four volumes of *Bibliography of Chemical Reviews* contain over 25,000 abstracts of reviews. That is a rather large number, but in terms of the cited references to the literature provided with most reviews, the numbers become much larger.

A sampling of the reviews indicates there are at least 40 bibliographic references in each review. This is the resulting average value when all review papers with no definitely stated number of references are counted in the total as having zero references. When only those reviews with a stated number of references are used in the total, the average is about 68 references per review. Thus, the 25,000 reviews provide between one million and 1.7 million literature references.

Of course, it must be realized that there probably is a great deal of duplication of references in the more than one million cited references, and what that amount of duplication is, is not known. In any case, we can see

what a powerful information retrieval tool a collection of reviews can be.

### SELECTING THE REVIEWS

A few statements might be appropriate about the material we put into *Bibliography of Chemical Reviews*. First of all, I include every abstract which the abstractor has stated is a review. If it is both a review and a presentation of new work, then we attempt to alter the abstract to suit our purposes. Also, we include any abstracts of separate bibliographies.

There are a number of papers described as discussions. I try to examine the original papers here and in other borderline cases. Usually I accept this kind of material if it has a number of references to the literature. The same thing applies to lectures. There I try to distinguish review lectures from lectures where only new information is presented. I also include biographical material about chemists if there is a list of publications appended.

Beginning with volume three of *BCR* we have included author and keyword-in-context indexes in each volume. Response to these changes has been favorable.

Changes in future volumes will depend both upon the needs of the users and further developments in the general area of information storage and retrieval.

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## Development and Use of Records in the Processing of Technical Papers in an Industrial Organization\*

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One of the more important facets of the corporate image presented by an industrial corporation today is the quality, quantity, and placement of its technical publications. The current surge of interest in basic research has caused a company to be judged in a large part in the scientific community by the papers of its staff that appear in such scholarly journals as *The Journal of the American Chemical Society* or *The Journal of Physical Chemistry*. Indeed, one might say that publications of the right type in the right journals have become a corporate status symbol.

The individual author also feels this need for good publications. This is instilled in his university training by his professors, whose chief means of gaining prestige and stature in the sciences has been through publications. There is also the desire of the true scientist to exchange his findings with others working in his field around the

world. Finally, as he progresses in an industrial organization, the professional man finds that his publications are a good means of bringing himself and his work to the attention of his colleagues not only in his own immediate area, but throughout the industry.

The legal staffs of industrial companies also have an interest in publications, apart from security, since the timing of technical disclosures in publications can influence the future of their own and competitive patents in a given field.

### INTERNAL CONTROL

Faced with this snowballing interest in publication, companies have recognized that some means of internal control must be established to guide the author and to protect company interests. This is usually accomplished through formulation of clearance or review procedures of

\* Paper presented before the Division of Chemical Literature, 143rd National Meeting of the American Chemical Society, Cincinnati, Ohio, January 14, 1963.

varying degrees of complexity with at least three over-all goals.

1. To ensure the technical accuracy and appropriateness of the information in the publication,
2. To protect the company's patent position from premature or disadvantageous disclosures, and
3. To prevent the give-away of technical know-how that may not be patentable but may be of greater value.

An excellent study of these clearance procedures has recently been reported by the National Science Foundation.<sup>1</sup> Of the 147 companies surveyed in this study, almost all had established some review procedure. The number of company officials required to pass on approval of proposed publications ranged from one to twelve, and the time required for review from two to eight weeks. Other pertinent references include a brief description by Marschner and Howe<sup>2</sup> of The Standard Oil Company of Indiana's clearance system, which utilizes a publications committee with two permanent and three rotating members, and a general discussion by Weil<sup>3</sup> on "What Organizations Are Doing to Improve Papers."

At Esso Research and Engineering Company, approval in principle for preparing a technical paper is usually agreed upon within the author's own division, but it may be checked at a higher level. When the paper itself has been prepared, the director of the division then reviews it and decides into which of two classes the paper falls. The first group contains technical articles that do not deal with new processes or products but which represent a new or worthwhile contribution to the scientific literature; general reviews of technical material; and descriptions of analytical methods and procedures. These articles may be released at the division director's own discretion, without further review.

Those papers that fall into the second category contain know-how information on processes and on the composition, formulation, and manufacture of new products. These must pass through a series of steps in a fixed review procedure that requires approval of three or occasionally four company executives in both legal and technical fields, and that takes about three weeks.

#### MANUSCRIPT RECORDS

Since over 300 papers of all types are handled by this system each year, a detailed record-keeping system is necessary to keep track of them. The initial record of a manuscript submitted is made on cards like those shown in Fig. 1 and 2. In the case of Category I papers, *i.e.*, those released by the author's own division, the title, author, journal, or meeting where the papers is to appear, etc., are entered on the cards, and a serial number is assigned to the paper. This serial number will be the key to any correspondence or future material dealing with the paper, and is the means of retrieval of the manuscript from company files. The card itself is then placed in a file arranged by the division and year.

In the case of Category II papers, requiring complete clearance, a different colored card is used and, in addition to the title, author, journal information, and serial num-

NO. _____		
TITLE _____		
AUTHOR(S) _____		DIV. _____
SENT T.I.D. _____	DEADLINE _____	MANUSCRIPT _____ ABSTRACT _____
NOTIFIED _____	REPLIED _____	COMMENTS _____
F.L.M. _____	_____	_____
PATENT _____	_____	_____
W.E.L. _____	_____	_____
E.J.G. _____	_____	_____
C.L.F. _____	_____	_____
FILED _____	CLASS _____	MEETING _____
ABSTRACTED _____	PUBLICATION _____	
ACT. PUBL. DATE _____		

Fig. 1.

NO. _____		
TITLE _____		
AUTHOR(S) _____		DIV. _____
SENT T.I.D. _____	MANUSCRIPT _____	ABSTRACT _____
CATEGORY I		
FILED _____	CLASS _____	MEETING _____
ABSTRACTED _____	PUBLICATION _____	
ACT. PUBL. DATE _____		

Fig. 2.

ber, space is provided for noting the reviewers to whom the paper was sent and for a brief notation of their comments, if any. This permits followup on replies from the reviewer and also indicates when the review has been completed by all involved. The comments of the reviewers are summarized in a letter to the author giving permission to release the paper to the journal or society intended, indicating desired or required revisions, or withholding permission for stated reasons.

A detailed writeup of the approval procedure is provided to all research and development groups in Esso Research and its affiliates for their guidance. Occasionally there are "emergency" requests for clearance in less than the specified three weeks, and forgetful authors may neglect to provide copies of locally approved papers. On the whole, however, the system works quite smoothly.

#### PUBLICATION RECORDS

While these records of papers submitted sometimes provide valuable short-range information on "what's doing" in the company, they do not provide the needed permanent record of company contributions to science and technology. Once a manuscript has been approved for publication and recorded, we must then ascertain where and when it actually appears in print (usually 1 to 1.5 years after submission). This reference is most often provided through the Technical Information Division's extensive abstracting program, which covers both foreign

and U. S. technical journals. Authors often provide reprint copies with bibliographical data. Finally, a double check is made in which all major research divisions are asked at the end of each year for a list with complete bibliographical data of all publications by members of their divisions during the year.

Having obtained the information on actual publication, we must now put it in a form that makes it usable as a reference tool. We have tried a variety of record-keeping systems in the past. The first was simply typing lists directly from the preliminary record cards. This proved to be too time-consuming, since several arrangements of the titles were desired, *i.e.* by subject, author, division, journals, etc., and each different arrangement meant retyping the entire batch of cards.

We next experimented with a punched-card system in which titles and authors were typed on one portion of the card, and the remainder was punched for machine sorting under the desired parameters. This system, developed by Compos-O-List, permitted the cards to be sorted and photo-reproduced as many times as desired with one typing, but the punched cards did not provide enough room to show the full bibliographic reference for each paper. In addition, the relatively small number of cards and sorts involved did not really justify the cost and time required for punching and machine sorting.

Our present system uses a 3 × 5-inch card printed in nonphotographic blue ink that provides sufficient space for typing the titles, authors, and reference (Fig. 3). The squares across the bottom of the card are used for code

VAN BURKLEO, G.G. & BARNETT, L.A.M.: "HUMBLE OIL'S BATTERY OPERATED MULTICHANNEL COMMUNICATIONS SYSTEM FOR AN OFF-SHORE UNIT," PIPE LINE IND. 13 #1:46-49 (JULY 1960)				
MS. NO.	DIVISION	CLASS.	PUBL.	YEAR
60-43	19	50	095	60

Fig. 3.

entries to show the year and serial number of the original manuscript, the division from which it was issued, the subject classification, the journal in which it appears, and the year of publication. It is relatively simple to sort and arrange these cards by hand and then to place them in aluminum photo panels for photographing. These holders were developed by the Hercules Powder Company and were described in a paper presented at the 141st National Meeting of the American Chemical Society, Washington, D. C., March, 1962, before this division.<sup>4</sup> A list produced by this method is shown in part in Fig. 4.

The codes used involve a simple two- or three-digit system. The subject classification might be of some interest. It contains three major groupings: basic research, applied research, and miscellaneous other classes (Fig. 5). The breakdown within a major group is shown in Fig. 6.

<b>MISCELLANEOUS</b>  KEVORKIAN, V.: "SHOULD YOU BE DOING SHOCK TUBE RESEARCH" <u>CHEM. ENG.</u> :107-112 (10/3/60)		FUREY, M. TOP11 SUI LI :205-
<b>APPLIED RESEARCH</b>  PROCESSES  BARR, F.T.: "TECHNIQUES FOR EVALUATING PETROLEUM PROCESSES," <u>CHEM. ENG. PROGR.</u> 56 #12:53-59 (DEC. 1960)		HILL, M.W. PETRI DIV. F 19 (AI)
		NITSCH, W. BESCI BITUM BITUM ASPH/

Fig. 4.

CLASSIFICATION OF PAPERS
<ul style="list-style-type: none"> <li>• BASIC RESEARCH</li> <li>• APPLIED RESEARCH</li> <li>• ENGINEERING RESEARCH</li> <li>• APPLIED ENGINEERING</li> <li>• ANALYSES &amp; TESTS</li> <li>• MEDICAL &amp; SAFETY</li> <li>• GENERAL &amp; TRADE</li> <li>• REVIEWS OR COMMENTS ON PAPERS BY OTHERS</li> <li>• MISCELLANEOUS</li> </ul>

Fig. 5.

CLASSIFICATION OF PAPERS
BASIC RESEARCH <ul style="list-style-type: none"> <li>• 00 PETROLEUM, ORIGIN &amp; NATURE</li> <li>• 01 ORGANIC CHEMISTRY</li> <li>• 02 PHYSICAL CHEMISTRY</li> <li>• 03 CATALYSTS &amp; CATALYSIS</li> <li>• 04 INORGANIC CHEMISTRY</li> <li>• 05 MATHEMATICS</li> <li>• 06</li> <li>• 07</li> <li>• 08</li> <li>• 09 MISCELLANEOUS</li> </ul>

Fig. 6.

## USE OF RECORDS

The classified lists produced by this system serve a variety of purposes, depending upon their arrangement. One use is to provide management with a measure of the professional contributions of the various divisions, accomplished by arranging the cards by the authors' division for published papers for a given period of time.

A second use is to assist public-relations people with various projects. At Esso Research, our Public Relations

Division uses our list of basic-research papers published each year as the basis for preparing digests for inclusion in a magazine entitled *Search*; this is distributed throughout the scientific community and also serves as an important aid to recruiters visiting university campuses.

A Scientific Liaison Group in our company also makes use of these lists to provide information to universities or consulting groups.

It may be seen, then, that well prepared lists of company publications, classified as needed, can be useful tools in a variety of ways in an industrial organization.

- (1) "Publication of Basic Research Findings in Industry, 1957-1959." NSF61-62 National Science Foundation, Washington, D. C., 1961.
- (2) R. F. Marschner, and J. O. Howe, "Better Written Reports," *Res. Management*, 3, No. 3, 147-155 (1960).
- (3) B. H. Weil, "What Organizations Are Doing to Improve Papers," *Chem. Lit.*, 7, No. 2, 3 (1955).
- (4) H. Skolnik, and M. R. Payson, "Three Posting Methods for the Preparation of a Cumulative List," *J. Chem. Doc.* 3, 21 (1962).

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## Government-Sponsored Research Reports in Three Areas of Physical Chemistry\*

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In the last five or six years, there has been much discussion regarding the value of the unpublished government-sponsored research report as a medium of scientific communication.<sup>1-6</sup> As a result of interest stimulated by the Humphrey Committee investigations of problems on coordinating government research information,<sup>7,8</sup> and through the leadership of the National Science Foundation, great strides have been made in recent months toward wider dissemination of information gathered in research under government sponsorship, not only to persons performing this research, but to the members of the scientific community at large.

As a first step in exploring the use of these unpublished technical reports by physicists and chemists in the Los Angeles area, the present study was undertaken to examine in some depth just what is available in this literature in three areas of physical chemistry and to note some of the characteristics of the reports and some problems associated with searching for this type of information. The case histories which we shall present originated as requests for open literature surveys and were conducted by members of the Literature Research Group at Aerospace Corporation.

As our company is a relatively new one, it might be of interest to interpose here a brief description of Aerospace Corporation and its mission.

At the request of the U. S. Air Force, and with its support, Aerospace Corporation was established in June, 1960, to perform research, development, and advisory services for the U. S. Government and to contribute to the support of scientific activities and projects for the Government. One major mission of the Corporation is to serve the Air Force in the management of space systems

and advanced ballistic missiles. Members of the Laboratories Division, where both basic and applied research are conducted, requested the literature surveys which we have selected as case studies for this paper. We wish to emphasize at this point that we do not propose to draw any generalizations from these studies. Being user-oriented, our approach has been 100% pragmatic, and the observations which we shall make are purely subjective.

To paraphrase a hyperbole which is original with a well known experimental psychologist, searching the report literature is like poking a haystack with a needle. Approaches are diffuse, and once a search has been made, there is no way of estimating its completeness. The chief source of report literature covering a wide range of subject fields is the *Technical Abstract Bulletin* of the Armed Services Technical Information Agency, issued primarily for the use of Department of Defense contractors. The unclassified section of the *Technical Abstract Bulletin* is made available to the general public by duplicate publication in *U. S. Government Research Reports*, issued by the Office of Technical Services. Ideally, ASTIA's collection should include all of the reports generated by recipients of about 75% of the Government's research and development dollars. ASTIA officials, however, have stated that ASTIA now receives, and lists in its Bulletin, about one-tenth of the reports which defense contractors have produced.

One of the major handicaps of the report literature indexes is that none of them has had a sufficiently long period of development for indexing policies and practices to be crystallized to some degree of consistency. Inconsistencies in quality of abstracts complicate the problem. *Nuclear Science Abstracts*, which aims at complete coverage of report as well as journal literature in its field, is a notable exception. Its subject indexing, though broad, is consistent and prompt. *International Aerospace Ab-*

\* Presented before the Division of Chemical Literature, ACS National Meeting, March 22, 1962, Washington, D. C.