



CSIRO Operational Plan

1997–1998



CSIRO Operational Plan

1997 - 1998

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Coordinated and compiled by CSIRO Strategic Planning and Evaluation.
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Foreword

1997-98 promises to be an exciting year for CSIRO. After many months of hard work we have re-shaped our internal structure, set in place a vital system of external advisory committees, and identified priority directions for research in each of the Sectors we serve. With much of this necessary preparatory work behind us, CSIRO is now in a stronger position to pursue the research challenges and opportunities that lie before us.

1 July 1997 marks the commencement of a new funding triennium for CSIRO. Our strategies for the triennium are squarely focussed on the twin goals of maintaining excellence in research and delivering outcomes which meet real needs and provide real benefits to Australia. Deliberations on research directions for the new triennium were greatly assisted by the Sector Advisory Committees established in the past year. The resulting plans for each of the 22 Sectors are summarised in the new CSIRO Strategic Research Plan 1997-98 to 1999-2000.

The Operational Plan for 1997-98 shows how the Strategic Research Plan will be put into effect in the first year of the triennium. It documents the major strategies, activities and outcomes planned for the year, and shows how resources have been allocated to the research Divisions and Corporate units responsible for bringing the plans to fruition.

We have set ourselves an ambitious program of work which will require a continuing commitment to our customers and to each other through inter-Divisional collaboration. As we achieve the outcomes foreshadowed in this Plan, we will further strengthen CSIRO's position as Australia's pre-eminent research organisation.

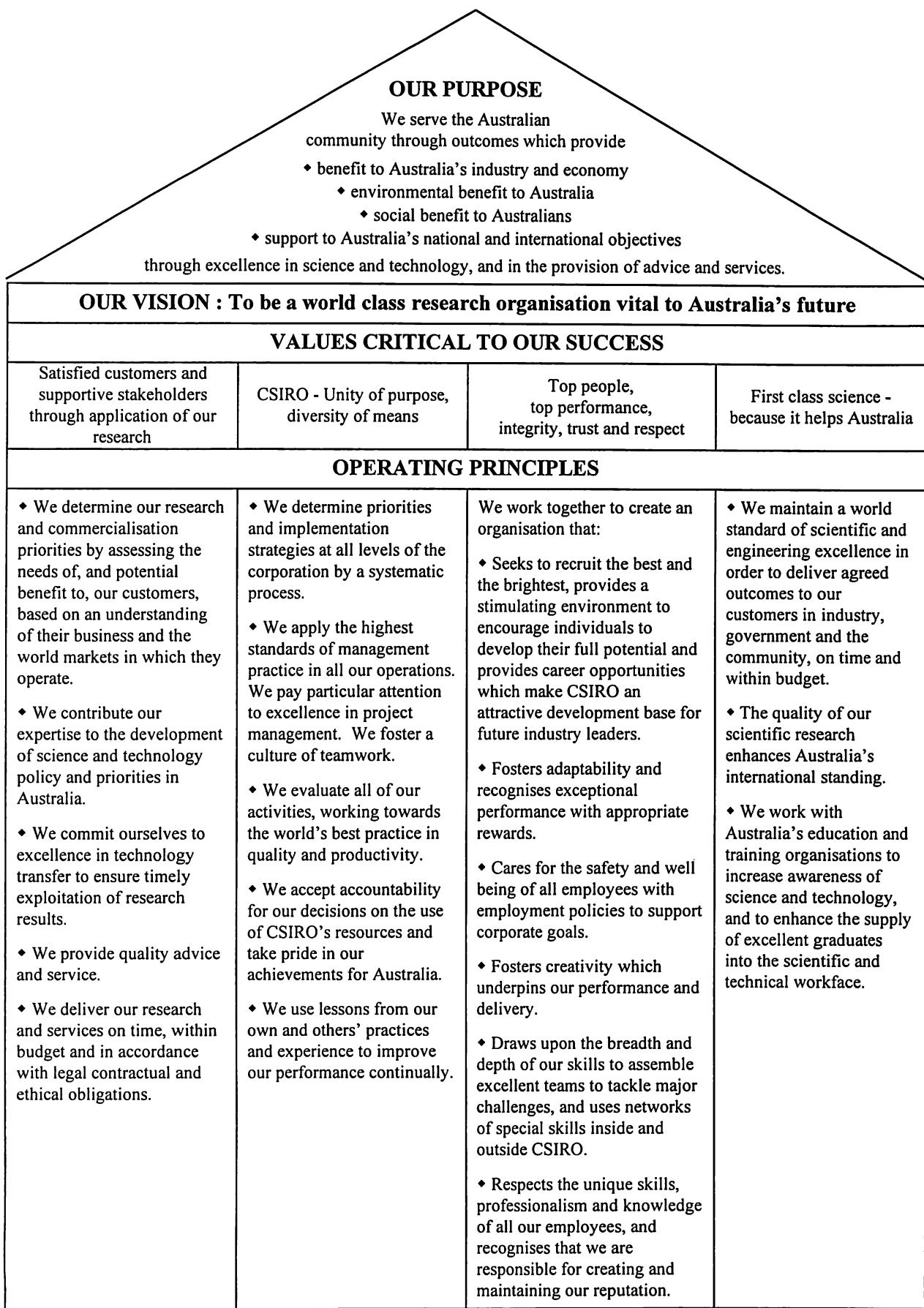
Malcolm McIntosh
Chief Executive
June 1997

The Commonwealth Scientific and
Industrial Research Organisation (CSIRO)
is an independent statutory authority constituted
and operating under the provisions of the
Science and Industry Research Act 1949.

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CSIRO's PURPOSE, VISION, VALUES AND OPERATING PRINCIPLES



CSIRO ORGANISATIONAL STRUCTURE

CSIRO BOARD

Mr D Charles K Allen AO (Chairman)
Dr MK McIntosh Mr KW Davern Dr SM Richards
Dr EG Tan Mr RA Higgins Prof EJ Woods OAM
Prof MJ O'Kane Mr AE de N Rogers

CSIRO EXECUTIVE

Dr Malcolm McIntosh
Chief Executive

Dr Colin Adam
Deputy Chief Executive
Chair: Minerals & Energy Alliance
Alternate Chair:
Manufacturing Alliance

Dr Bob Frater AO
Deputy Chief Executive
*Chair: Information Technology,
Infrastructure & Services Alliance*
Chair: Manufacturing Alliance

Dr Chris Mallett
Deputy Chief Executive
Chair: Agribusiness Alliance

Dr John Radcliffe OAM
Deputy Chief Executive
*Chair: Environment &
Natural Resources Alliance*

CSIRO DIVISIONS AND CORPORATE SUPPORT UNITS *

Corporate Executive Office
Corporate Secretary:
Dr EN Cain

Risk Assessment &
Audit
General Manager:
Mr P O'Callaghan

Building Construction &
Engineering
Chief: Mr LM Little
Coal & Energy Technology
Chief: Dr JK Wright
Exploration & Mining
Chief: Dr BE Hobbs
Minerals
Chief: Dr RD La Nauze
Petroleum Resources
Chief: Dr AF Williams

Australia Telescope National Facility
Director: Prof RD Ekers
Manufacturing Science and
Technology
Chief: Dr IR Sare
Mathematics & Information Sciences
Chief: Dr RL Sandland
Molecular Science
Chief: Dr TH Spurling
Telecommunications & Industrial
Physics
Chief: Dr DN Cooper

Animal Health
Chief: Dr MD Rickard
Animal Production
Chief: Dr O Mayo
Food Science & Technology
Chief: Dr MJ Eyles
Human Nutrition
Chief: Prof. RJ Head
Tropical Agriculture
Chief: Dr E Heij
Wool Technology
Chief: Dr B Bateup

Atmospheric Research
Chief: Dr GI Pearman
COSSA
Head: Dr BJ Embleton
Entomology
Chief: Dr P Wellings
Forestry & Forest Products
Chief: Dr GA Kile
Land & Water
Chief: Dr G Harris
Marine Research
Chief: Dr N Bray
Plant Industry
Chief: Dr WJ Peacock
Wildlife & Ecology
Chief: Dr BH Walker

Corporate Property
General Manager: Mr GJ Harley
Legal Network
Chair: Dr CM Adam

Information Technology Services
General Manager: Mr J Potter
CSIRO Publishing
General Manager: Mr P Reekie
Strategic Planning & Evaluation
General Manager: Dr AJ Pik

Corporate Finance
General Manager: Mr RJ Garrett

Corporate Human Resources
General Manager: Mr P O'Keefe

* Divisions and Corporate Support Units are shown below the Executive member having oversight of the Division/Unit

CSIRO STRATEGIES

In March 1996, CSIRO commenced implementation of a fundamental reorientation of its management and structure. Much more than a reorganisation, it reflects a purposeful redefinition of the way CSIRO identifies, plans, conducts and markets its research. The new matrix-style approach involves CSIRO-wide planning and resourcing of research along sectoral lines, while the conduct and delivery of research is undertaken by CSIRO's Divisions in accordance with Sector Plans.

A key element of the new approach is the identification of 22 Sectors representative of industries, markets and natural resources of national significance. Planning of CSIRO's participation in each Sector is greatly assisted by an external Sector Advisory Committee which helps CSIRO to identify those points at which our involvement can make the greatest contribution. Planning in this way emphasises our focus on identifying and serving the needs of the Australian community. The Sector Plans form the basis of the CSIRO Strategic Research Plan for the triennium 1997-98 to 1999-2000. (Sector Plans are available from Divisions operating in each Sector as shown in the matrix on page 4).

A second key element of the new approach is the strengthening of CSIRO's Divisions as the focus of the Organisation's disciplinary skills base and as the key business or operating units of CSIRO. It is therefore appropriate that the CSIRO Operational Plan is presented on a Divisional basis. Since March 1996 the number of Divisions has been reduced through a series of mergers (see box on page 5). The twofold purpose has been to maximise opportunities for development of synergistic disciplinary relationships and to maximise the proportion of resources available for research.

CSIRO's strategies for the new triennium are reflected in six themes: Focus; Teamwork and Collaboration; Balance; Excellence; Communication; and Fiscal Responsibility. Each of these is discussed in more detail in the CSIRO Strategic Research Plan 1997-98 to 1999-2000.

[1] Focus on real needs and realistic commitments.

In planning for the new triennium, a review of CSIRO's activities and opportunities highlighted CSIRO's impressive array of scientific achievements and diverse contributions to the nation, but raised the concern that resources in some areas may have been spread too thinly. Hence, a primary strategy for CSIRO is to focus increasingly on those research opportunities which are relevant to real economic, social or environmental needs, where CSIRO has an appropriate role and capability, and where there are firm signals of external support for CSIRO's involvement. This does not diminish

CSIRO's commitment to longer term basic or strategic research. Rather, it recognises the importance of explicit recognition and prioritisation of such research within the context of Sector needs and CSIRO's capacity.

[2] Working with customers. CSIRO's key legislated role is to carry out scientific research to assist Australian industry and further the interests of the Australian community. To do this successfully, CSIRO's efforts must not only focus on relevant research issues, they must also be grounded in a capacity to listen to, and work with, the customers and end-users for whom research is being conducted. The Sectoral approach will greatly assist CSIRO in strengthening this capacity. To foster the efficient delivery and effective application of new knowledge and improved technologies, CSIRO will continue to upgrade its commercial practices and will adopt flexible and responsive modes of working with customers.

[3] Encouraging teamwork and collaboration. CSIRO's core strength, which sets it apart from other research agencies, is the capacity to assemble and manage teams of highly skilled professionals from a wide range of disciplines. The move to Sector-based operations and Divisional amalgamations opens the door to fresh opportunities for interdisciplinary collaboration. Where there are complementary roles and expertise, CSIRO will also seek to expand collaboration with other research performers and extension services in both the public and private sectors. For example, solutions to many of today's complex problems require insights from economics and the social sciences as well as from the natural/physical sciences and engineering.

[4] Achieving a balanced research portfolio. CSIRO requires a balanced portfolio of research based on short, medium and longer term needs. Research timescales oblige us to look beyond the lifetime of individual governments and the investment cycle of many businesses. To remain vital and relevant to emerging challenges, our interactions with customers and stakeholders must raise mutual awareness of what strategic research is needed to underpin future advances and of what is needed now to address immediate concerns.

[5] The pursuit of excellence: quality people - quality processes - quality outcomes. CSIRO has a reputation for excellence in research and development. This commitment to excellence will be applied in every aspect of our endeavours including staff training and development, research management, administrative support, customer relations, marketing and commercialisation. The Sector Plans reinforce this strategy by explicitly addressing these aspects as well as specific research objectives.

Corporate Overview

CSIRO OPERATIONS AND REPORTING Chief Executive - Dr Malcolm McIntosh									
	ALLIANCES and SECTORS								
	Agribusiness			Environment & Natural Resources		Information Technology, Infrastructure & Services		Manufacturing	Minerals & Energy
	Field Crops	Food Processing	Forestry, Wood & Paper Industries	Horticulture	Meat, Dairy & Aquaculture	Wool & Textiles	Biodiversity	Climate & Atmosphere	Land & Water
Deputy Chief Executives									
DIVISIONS									
Dr Chris Mallett									
Animal Health	●			● ●					●
Animal Production				● ●	●	●			
Food Science & Technology	● ●	● ●	● ●					● ●	
Human Nutrition	● ●			●					●
Tropical Agriculture	●			● ●	● ●	● ●			
Wool Technology				●					
Dr John Radcliffe									
Atmospheric Research					●				●
COSSA		●			● ●	● ●	● ●		●
Entomology	●	● ●	● ●	●	● ●	● ●	●	●	●
Forestry & Forest Products		●			● ●	● ●	●	●	
Land & Water	●	● ●	● ●	●	● ●	● ●	●	● ● ●	● ● ●
Marine Research				●	● ●	●	●		●
Plant Industry	● ●	● ●	● ●	● ●	● ●	● ●		● ●	
Wildlife & Ecology	● ●	●	● ●	● ●	● ●	● ●	●	● ●	● ●
Dr Bob Frater									
Australia Telescope National Facility							●		
Manufacturing Science & Technology		●				●	●	● ● ●	● ● ●
Mathematical & Information Sciences	● ●	● ●	● ●	● ●	● ●	● ●	● ●	● ● ●	● ● ●
Molecular Science						●		● ● ●	●
Telecommunications & Industrial Physics				●	●		● ● ●	● ● ●	● ●
Dr Colin Adam									
Building Construction & Engineering						●		● ●	●
Coal & Energy Technology					● ● ●			● ● ●	● ● ●
Exploration & Mining					●			● ● ●	● ● ●
Minerals								●	● ● ●
Petroleum Resources								● ●	● ●

Mergers of CSIRO Divisions since March 1996	
New Division	Former Divisions
Land and Water	Soils Water Resources Centre for Environmental Mechanics
Manufacturing Science and Technology	Manufacturing Technology Materials Science and Technology
Marine Research	Oceanography Fisheries
Mathematical and Information Sciences	Mathematics and Statistics Information Technology Biometrics Units
Plant Industry	Plant Industry Horticulture
Telecommunications and Industrial Physics	Applied Physics Radiophysics
Tropical Agriculture	Tropical Animal Production Tropical Crops and Pastures

[6] **Enhancing communication.** Effective internal communication is essential if the positive benefits of change within CSIRO are to be maximised and the discomfort minimised. To this end, line managers will be assisted to develop the necessary skills and held accountable accordingly. Effective external communication is also essential in building and maintaining CSIRO's profile and reputation amongst our stakeholders and customers - particularly potential future customers. To this end the new National Awareness Program adds a new dimension to the continuing efforts of staff at all levels to promote awareness of the importance of science, and of CSIRO's contribution to the nation.

[7] **Fiscal responsibility.** CSIRO will exercise stewardship over some \$1.3 billion of government funds over the triennium. A very high priority is being placed on the restoration of financial health to all Divisions, and the maintenance of high standards of fiscal management and accountability.

OUTLOOK FOR 1997-98

1997-98 marks the commencement of a new funding triennium and the first year in which CSIRO's sectoral approach to research planning and delivery will be fully operational. CSIRO will need to concurrently manage the inevitable pressures associated with major internal changes while remaining focussed on performing excellent R&D directed to identified social, economic and environmental needs, and delivering the outcomes in a highly professional manner. Particularly high priority must be given to ensuring the utmost value is derived from the contribution of the 22 Sector Advisory Committees which comprise many of Australia's leading citizens in their respective fields.

Important developments in the external environment which may have a significant impact on the Organisation during the year include:

- Passage of the Commonwealth Authorities and Companies Bill, due to take effect from 1 July 1997.
- Government decisions in response to the "Stocker Review" of Australia's science and technology arrangements, due to report on 1 July 1997.
- Government decisions on the provision/outsourcing of information technology requirements by its departments and agencies, and on practices related to competitive neutrality.
- Response by the business sector to changes in government policies and programs in support of R&D.
- Initiation of the Natural Heritage Trust.

Some activities and outcomes of especially broad corporate significance planned for 1997-98 include:

- Implementation of a new CSIRO Project Support System to facilitate efficient financial management and reporting of projects in a manner consistent with the Division-Sector mode of operation.
- Implementation of changes to CSIRO's remuneration system to address anomalies in the present system and improve classification procedures.
- Revision of the CSIRO Commercial Practices Manual to reflect Organisational developments and changes in the commercial environment.

Corporate Overview

- CSIRO's US\$6.1million dollar contract to help the Indonesian national R&D agency LIPI strengthen its research management and commercialisation practices, will move from its inaugural phase into full swing.
- The contribution of Sector Advisory Committees will be strengthened by developing clear methods and means by which CSIRO will respond to their advice.

FINANCIAL RESOURCES AND STAFF NUMBERS BY OPERATIONAL UNIT 1997-98
(Estimates for 1997-98 as at June 1997)

	Direct Appropri	External Revenue	Total Revenue	Operating Result	Cash ¹ Balance	Research ² Staff	Total ³ Staff
	(\$'000)	(\$'000)	(\$'000)	(\$'000)	(\$'000)	(EFT)	(EFT)
Animal Health ⁴	10,961	8,798	19,759	0	-1,609	116	250
Animal Production	14,147	4,677	18,824	195	-4,417	121	183
Atmospheric Research	7,490	4,730	12,220	-651	1,507	94	138
Australia Telescope National Facility	11,614	4,498	16,112	2,358	2,831	58	135
Building, Construction and Engineering	18,130	9,768	27,898	0	1,040	176	256
Coal and Energy Technology	11,517	9,750	21,267	-748	1,376	127	185
CSIRO Office of Space Science and Applications	2,488	620	3,108	-468	601	11	17
Entomology	14,244	15,380	29,624	-992	-346	233	299
Exploration and Mining	16,280	15,311	31,591	814	1,494	167	242
Food Science and Technology	14,611	10,236	24,847	-466	5,409	148	212
Forestry & Forest Products	16,894	9,865	26,758	-1,561	5,820	194	274
Human Nutrition	5,926	3,073	9,000	-166	1,942	78	94
Land and Water	27,754	14,741	42,495	51	2,590	290	453
Manufacturing Science and Technology	25,865	17,251	43,116	1,367	-1,285	236	326
Marine Research	19,941	10,100	30,041	-1,382	4,298	213	303
Mathematical and Information Sciences	23,061	7,917	30,978	-1,777	3,163	174	239
Minerals	19,808	14,065	33,873	107	1,264	200	294
Molecular Science	24,489	10,187	34,676	466	964	238	318
Petroleum Resources	5,518	4,672	10,190	810	-271	56	69
Plant Industry	29,127	15,940	45,066	-1,053	4,715	378	504
RV <i>Franklin</i> (A National Facility) ⁵	4,209	430	4,639	-536	434		10
Telecommunications and Industrial Physics ⁶	35,995	12,445	48,440	239	4,816	310	447
Tropical Agriculture	19,567	11,272	30,839	-146	5,127	221	325
Wildlife and Ecology	14,530	8,128	22,658	0	3,063	156	240
Wool Technology	11,563	11,597	23,160	-810	9,867	147	252
Centre for Mediterranean Agricultural Research	172	22	194	70	199	1	8
Environmental Projects Office	71	3,189	3,260	29	1,642	4	9
Magnesium Project		239	239	-3,122	-989		
CSIRO Executive	6,623	205	6,828	-19	-19	7	35
Corporate Support Units	34,139	7,124	41,263	5,527	2,256		276
Capital Program ⁷	763	1,394	2,157	-10,634	-14,289		
Corporately Managed Funds ⁸	19,340	250	19,590	9,340	-1,848		
TOTAL	466,837	247,874	714,710	-3,158	41,345	4,154	6,393

¹Estimated closing cash balance as at 30 June 1998.

²Includes Research Scientist/Engineer, Research Projects and Research Management functional classifications.

³Includes Research Staff plus Technical Services, Communication & Information, Administrative Services, General Services, Corporate Management and Senior Specialist functional classifications.

⁴Includes Australian Animal Health Laboratory

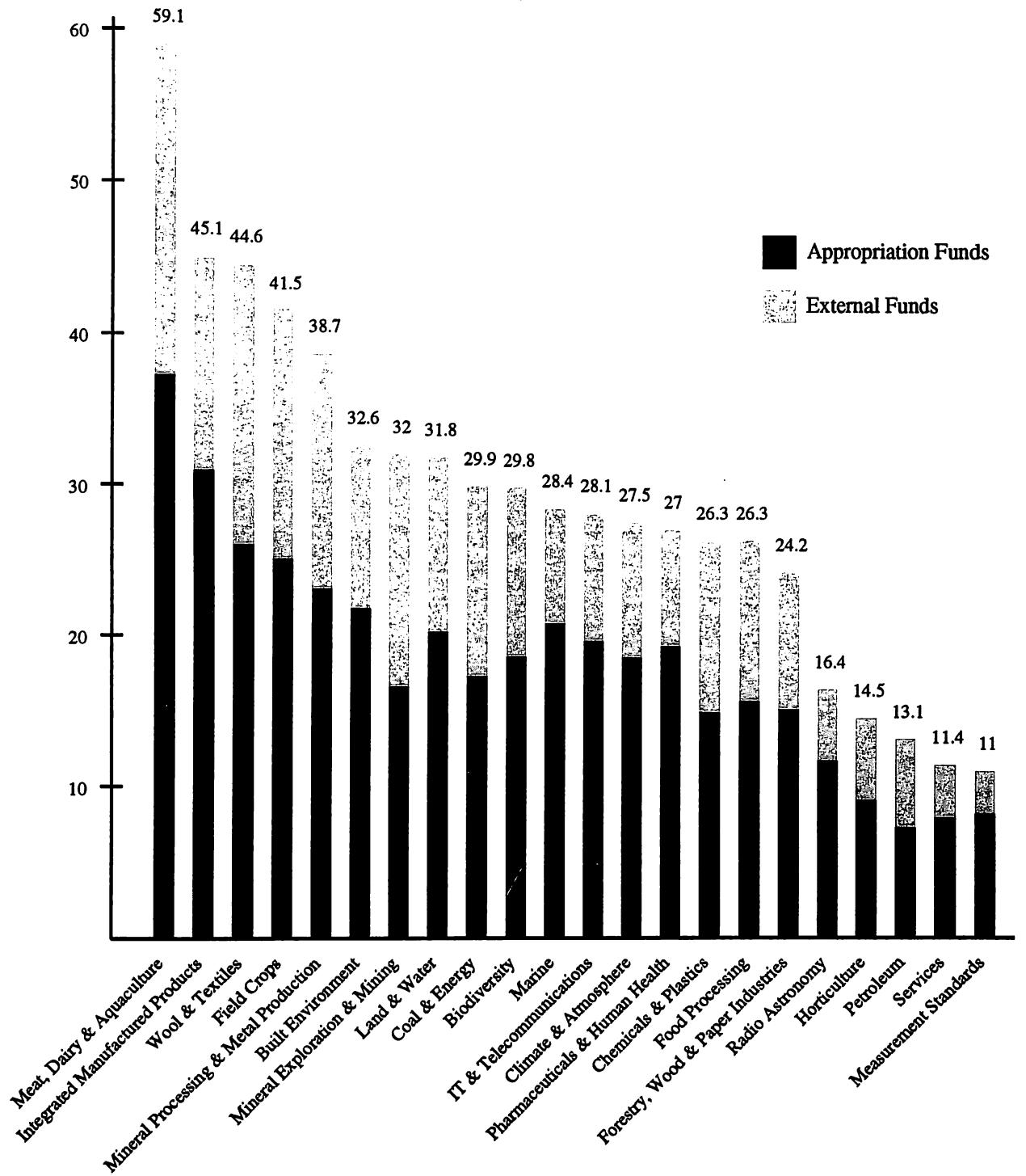
⁵A National Facility managed by CSIRO on behalf of the Government.

⁶Includes Australian National Measurement Laboratory.

⁷The total capital program for 1997-98 is \$48.2 million. This is mostly funded from an internal lease charged to, and included in, the budgets of operating units.

⁸This item is essentially the balance of Commonwealth funds yet to be allocated to Divisions, and at this time predominantly reflects the Federal Government's Budget commitment to CSIRO of \$20m per year for three years to be repaid over the same period from the proceeds of asset sales, commencing with a \$10m repayment in 1997-98.

PLANNED INVESTMENT IN SECTORS BY CSIRO'S OPERATIONAL UNITS IN 1997-98
\$Million



Corporate Overview

CSIRO PARTICIPATION IN COOPERATIVE RESEARCH CENTRES

Cooperative Research Centres (CRCs) undertake collaborative research and education programs in the fields of natural sciences and engineering, with a strong focus on commercial and other applications. They bring together researchers and research groups from universities, State government instrumentalities, business enterprises and Commonwealth research organisations such as the CSIRO. The Commonwealth Government provides up to fifty per cent of the cost of establishing and operating a Centre. The participating organisations contribute the balance of required resources in cash or kind.

Since the launch of the CRC Program in May 1990, 69 CRCs, grouped in six broad fields of research, have been established. In 1997-98, various CSIRO Divisions will be core participants in the 54 Centres listed below.

Further details on the CRC program, including information about the research focus and other core participants in individual CRCs, can be found at the following internet address:
<http://www.dist.gov.au/crc/index.html>

CRC Program Categories

Manufacturing Technology

CRC for Materials Welding and Joining

- CSIRO Manufacturing Science and Technology

CRC for Polymers

- CSIRO Molecular Science

CRC for Molecular Engineering and Technology: Sensing and Diagnostic Technologies

- CSIRO Food Science and Technology
- CSIRO Telecommunications and Industrial Physics
- CSIRO Molecular Science

CRC for Industrial Plant Biopolymers

- CSIRO Food Science and Technology

CRC for Intelligent Manufacturing Systems and Technologies

- CSIRO Manufacturing Science and Technology

CRC for Alloy and Solidification Technology

- CSIRO Manufacturing Science and Technology

CRC for International Food Manufacture and Packaging Science

- CSIRO Materials Science and Technology
- CSIRO Food Science and Technology

Information and Communications Technology

CRC for Intelligent Decision Systems

- CSIRO Mathematical and Information Sciences

CRC for Robust and Adaptive Systems

- CSIRO Telecommunications and Industrial Physics

CRC for Distributed Systems Technology

- CSIRO Mathematical and Information Sciences

Australian Photonics CRC

- CSIRO Telecommunications and Industrial Physics

CRC for Advanced Computational Systems

- CSIRO Mathematical and Information Sciences

Research Data Network CRC

- CSIRO-Macquarie University Joint Research Centre for Advanced Systems Engineering
- CSIRO Mathematical and Information Sciences

Mining and Energy

CRC for Mining Technology and Equipment

- CSIRO Exploration and Mining
- CSIRO Minerals
- CSIRO Manufacturing Science and Technology
- CSIRO Coal and Energy Technology

G K Williams CRC for Extractive Metallurgy

- CSIRO Minerals

A J Parker CRC for Hydrometallurgy

- CSIRO Minerals

Australian Petroleum CRC

- CSIRO Petroleum Resources

CRC for Australian Mineral Exploration Technologies

- CSIRO Exploration and Mining

Australian Geodynamics CRC

- CSIRO Exploration and Mining

CRC for New Technologies for Power Generation from Low-rank Coal

- CSIRO Minerals

CRC for Black Coal Utilisation

- CSIRO Coal and Energy Technology

CRC for Landscape Evolution and Mineral Exploration

- CSIRO Exploration and Mining

Australian CRC for Renewable Energy

- CSIRO Telecommunications and Industrial Physics

Agriculture and Rural Based Manufacturing

- CRC for Legumes in Mediterranean Agriculture
 - CSIRO Centre for Mediterranean Agricultural Research
- CRC for Plant Science
 - CSIRO Plant Industry
- CRC for Tropical Plant Pathology
 - CSIRO Tropical Agriculture
- CRC for Tropical Pest Management
 - CSIRO Entomology
- CRC for Temperate Hardwood Forestry
 - CSIRO Forestry and Forest Products
- CRC for Hardwood Fibre and Paper Science
 - CSIRO Forestry and Forest Products
- CRC for Viticulture
 - CSIRO Plant Industry
- CRC for Premium Quality Wool
 - CSIRO Animal Production
 - CSIRO Wool Technology
- CRC for the Cattle and Beef Industry (Meat Quality)
 - CSIRO Animal Production
 - CSIRO Animal Health
 - CSIRO Food Science and Technology
 - CSIRO Tropical Agriculture
- CRC for Aquaculture
 - CSIRO Marine Research
- CRC for Sustainable Cotton Production
 - CSIRO Plant Industry
 - CSIRO Entomology
- CRC for Food Industry Innovation
 - CSIRO Food Science and Technology
- CRC for Quality Wheat Products and Processes
 - CSIRO Plant Industry
- CRC for Sustainable Sugar Production
 - CSIRO Tropical Agriculture
 - CSIRO Land and Water
- CRC for Weed Management Systems
 - CSIRO Plant Industry
 - CSIRO Entomology

Environment

- CRC for Waste Management and Pollution Control
 - CSIRO Land and Water
 - CSIRO Molecular Science
 - CSIRO Coal and Energy Technology
- CRC for Soil and Land Management
 - CSIRO Land and Water
- CRC for Catchment Hydrology
 - CSIRO Land and Water
- CRC for Biological Control of Vertebrate Pest Populations
 - CSIRO Wildlife and Ecology
- CRC for the Antarctic and Southern Ocean Environment
 - CSIRO Marine Research
- CRC for Freshwater Ecology
 - CSIRO Land and Water
- CRC for Southern Hemisphere Meteorology
 - CSIRO Atmospheric Research
- CRC for Tropical Rainforest Ecology and Management
 - CSIRO Wildlife and Ecology
- CRC for Water Quality and Treatment
 - CSIRO Molecular Science
- CRC for Sustainable Development of Tropical Savannas
 - CSIRO Wildlife and Ecology
 - CSIRO Tropical Agriculture

Medical Science and Technology

- CRC for Tissue Growth and Repair
 - CSIRO Human Nutrition
- CRC for Cellular Growth Factors
 - CSIRO Molecular Science
- CRC for Eye Research and Technology
 - CSIRO Molecular Science
- CRC for Cardiac Technology
 - CSIRO Molecular Science
- CRC for Vaccine Technology
 - CSIRO Animal Health
 - CSIRO Tropical Agriculture
- CRC for Diagnostic Technologies
 - CSIRO Molecular Science

1. CSIRO Animal Health

Focus

CSIRO Animal Health is a national centre of excellence in disease diagnosis, research and policy advice in animal health. The Division aims to enhance the international competitiveness of Australia's animal industries, the well-being of Australians and the quality of their environment through the application of excellent research and quality services.

Outlook, Activities & Outcomes

- As global free trade increases, new international standards for disease surveillance are being developed. Customers are also demanding quality food, free from chemical residues and microbial contaminants. They are increasingly concerned about the impact of food production on global sustainability and the environment. The opportunities for Australia's livestock industries grow, provided that Australia keeps in front of these changes.
- Major research support activities and outcomes planned for 1997-98 include:
 - completion of site consolidation on one major site at Geelong.
 - completion of negotiations with Department of Primary Industries and Energy, to establish a research portfolio for DPIE's contribution to the Australian Animal Health Laboratory
 - sale of equipment and genetic stock from the SPF Unit at Maribyrnong and sale of Maribyrnong site
 - implementation of ISO 9002 in the Diagnostic Services Project.
- Key research activities and planned outcomes include:
 - swift diagnosis and investigation of exotic diseases and efficient and rapid participation in the management of animal disease outbreaks of national significance
 - essential diagnostic and scientific support for post outbreak disease control
 - minimisation of damage to international and national trade in livestock and livestock products following national disease emergencies
 - more sensitive and specific methods for the detection of Johne's disease in cattle
 - understanding of the method of transmission of equine morbillivirus (EMV) between horses, more sensitive and specific serological tests for this virus
 - greater understanding of the natural history of enterohaemorrhagic *E.coli* in cattle and sheep on farms and in feedlots
 - knowledge of the epidemiology and pathogenesis of fruit bat lyssavirus
 - development of sensitive and specific tools for diagnosis and epidemiology to reduce or eliminate the risk of disease incursion and spread especially in prawns
 - evaluation of porcine cytokines
 - vaccines for infectious disease in intensive

livestock systems: porcine pleuropneumonia vaccine transferred to commercial partner; commercial partner found for *P.haemolytica* vaccine for feed lot cattle.

Planned Investment Profile

Sector	%
Meat, Dairy & Aquaculture	81.1
Wool & Textiles	14.8
Food Processing	2.7
Integrated Manufactured Products	1.4

Resource Summary 1997-98*

Direct Appropriation Revenue	\$10,961,000
External Revenue	\$8,798,000
Total Revenue	\$19,759,000
External to Total Ratio	44.5%
Operating Result	\$0
End of Year Cash Balance	\$-1,609,000
Research Staff (EFT)	116
Total Staff (EFT)	250

*For explanatory notes see footnotes to Table on page 6

2. CSIRO Animal Production

Focus

CSIRO Animal Production supports the international competitiveness and sustainability of Australia's livestock industries in the temperate climatic zones. The Division makes its major contribution to the Wool and Textiles Sector, with a large contribution to Meat, Dairy and Aquaculture, and small but potentially growing contributions to the Marine and Climate and Atmosphere Sectors.

Outlook, Activities & Outcomes

- The Division has now completed the integration of the former Division of Animal Health program on parasite control with its other activities based on genetics, nutrition, reproduction and modelling. After the severe reduction in staff with all the difficulties entailed for morale, a major goal in 1997-98 is to build on the disciplinary strengths and industry linkages to broaden the Division's range of customers outside the traditional extensive ruminant sector.
- A major challenge for the Division is to sustain the close and profitable working relationship with the International Wool Secretariat while undertaking the broadening described in the previous point. In these circumstances, the Division will have to work very hard to maintain its external funding.
- The Division expects to see the launch in 1997-98 of Biological Wool Harvesting by a significant commercial entity. At the same time, the Nemesis Worm Control Program will be completed and DNA Pedigreeing should be launched as a service in the Merino industry. Thus, the Division will be continuing to make major contributions to the wool industry.

Planned Investment Profile

Sector	%
Wool & Textiles	56.5
Meat, Dairy & Aquaculture	41.5
Climate & Atmosphere	1.4
Marine	0.6

Resource Summary 1997-98*

Direct Appropriation Revenue	\$14,147,000
External Revenue	\$4,677,000
Total Revenue	\$18,824,000
External to Total Ratio	24.8%
Operating Result	\$195,000
End of Year Cash Balance	\$-4,417,000
Research Staff (EFT)	121
Total Staff (EFT)	183

*For explanatory notes see footnotes to Table on page 6

3. CSIRO Atmospheric Research

Focus

CSIRO Atmospheric Research strives to solve significant problems concerning the physics, dynamics, and chemistry of the atmosphere over the Australian region, and of the globe insofar as it affects the Australian region, and to provide the best possible scientific advice and solutions on problems and issues involving the atmospheric environment. Specifically, the Division addresses issues such as urban and regional air pollution, acid deposition, the enhanced greenhouse effect, ozone depletion, climatic variability and severe weather. Research tools include a range of computer-based climate and atmosphere models as well as remote sensing and other atmospheric monitoring instruments. Key stakeholders include Commonwealth and state environment departments, environment protection authorities, and energy and mineral resource companies.

Outlook, Activities & Outcomes

- Over 95 per cent of the Division's activities contribute to the Climate and Atmosphere Sector and represent about 50% of the total Sector effort. The Division also contributes to a number of CSIRO's Multi-Divisional Programs including the Climate Change Research Program, the Climate Variability and Impacts Program, and the Air Quality Program.
- The Division is developing and applying a number of sophisticated climate models for assessing likely future regional changes to climate as well as testing model-based multi-seasonal predictions. We will continue to provide advice on regional impacts of climate change for various State and Territory governments and to build tools for integrated climate impact assessment.
- The Division will be a major user of the new joint supercomputing facility that will be shared by CSIRO and the Bureau of Meteorology. The new facility will support the Division's climatic modelling efforts.
- On an ongoing basis, the Division conducts research on the changing composition of our atmosphere using the Cape Grim Baseline Air Pollution Station, in Tasmania. Jointly managed by the Bureau of Meteorology and CSIRO, the Cape Grim program is the foremost of its type for monitoring pollutant levels in southern hemispheric air.
- A number of major national and international field experiments will be conducted including Australia-wide validation of satellite-based aerosol monitoring.
- The Division will continue significant interaction with Commonwealth, State and Territory Departments of the Environment on air quality characterisation and modelling, with applications to health risk assessment.
- The Division will undertake a number of national and overseas consultancy studies including the Hong Kong Territory-wide Air Quality Modelling System project. Projects typically involve Australian and overseas partners and contribute to scientific advances in environmental management.
- The Division receives significant external support for its greenhouse research from the National

Greenhouse Research Program of Environment Australia (Department of the Environment, Sport and Territories). Environment Australia is the Division's foremost external funding agency, but there is increasing support from resource industries.

- The Division aims to achieve 39 per cent of total earnings from external sources.

Planned Investment Profile

<i>Sector</i>	<i>%</i>
Climate & Atmosphere	98.8
Petroleum	1.2

Resource Summary 1997-98*

Direct Appropriation Revenue	\$7,490,000
External Revenue	\$4,730,000
Total Revenue	\$12,220,000
External to Total Ratio	38.7%
Operating Result	\$-651,000
End of Year Cash Balance	\$1,507,000
Research Staff (EFT)	94
Total Staff (EFT)	138

*For explanatory notes see footnotes to Table on page 6

4. Australia Telescope National Facility

Focus

Australia is ranked among the top five countries in ground-based optical and radio astronomy, and the CSIRO's Australia Telescope National Facility (ATNF) is Australia's pre-eminent radio astronomy institution. It is the only facility in the world which can make high-resolution images of the southern sky at radio wavelengths. The current major focus of ATNF is on maintaining its operation and development as a prestigious world-class national research facility dedicated to the advancement of knowledge and providing a showpiece for Australian technology.

Outlook, Activities & Outcomes

- During 1997-98, a management restructure will be implemented, focussing activities according to new guidelines into programs of Astronomy & Computing, National Facility Support, Engineering/ Operations, Research Support, Major National Research Facility upgrade and our two Observatories at Parkes and Narrabri.
- Key activities in 1997-98 will include:
 - implementation of new management arrangements with all activities re-identified in terms of programs and projects
 - new research in astronomy and astrophysics, including participation in the new international space-VLBI (Very Long Baseline Interferometer) program
 - upgrading of ATNF and VLBI facilities in accordance with the Major National Research Facilities Program
 - operation of the Parkes, Narrabri and Mopra Observatories, and the Long Baseline Array (LBA) network, as National Research Facilities
 - operation and development of computing facilities required for supporting a Major National Research Facility
 - development of a new generation of ATNF instrumentation
 - continuation of external agreements involving telescope use
 - promotion of ATNF activities through information and educational resources.
- The major expected outcomes from the above activities include:
 - at least 50 scientific papers published in refereed journals
 - commissioning of a new multi-beam receiving system installed on the Parkes 64m radio telescope for observations of cosmic neutral hydrogen gas
 - at least 15% of the southern sky, and 30% of the 'Zone of Avoidance' (the optically obscured region along the centre of the Milky Way) covered in the first multi-beam survey of hydrogen in the local universe
 - an agreement with Onsala Space Observatory yielding Australian 5% observing access to the Swedish-ESO Submillimetre Telescope (SEST) in Chile
 - access to ATNF's research facilities that satisfies the Australian and overseas community of scientific users

- at least 60% utilisation of the Narrabri Compact Array and Parkes radio telescope, with time lost during scheduled observing periods kept to below 5%
- full operation of a new six-station LBA correlator facility
- successful support of the Japanese VSOP Space-VLBI mission by allocation of observing times of 5% at Narrabri and Parkes, and 25% on the 'Mopra' 22m antenna
- active international participation in the development and commissioning of the new Astronomical Image Processing System (AIPS++)
- commencement of MNRF upgrade, including: beginning of construction of new east-west stations and north-south spur track for the Compact Array; design of new electronics to particularly support high-frequency upgrades for ATNF radio telescopes and Ceduna antenna to be operated by the University of Tasmania
- cryogenic testing of microwave monolithic integrated circuit (MMIC) devices in a joint ATNF-DTIP 3-mm wavelength array study
- continued support (for up to 10 hours per day) at Parkes, under contract with NASA, of NASA's Galileo mission to Jupiter.

Planned Investment Profile

Sector	%
Radio Astronomy	100.0

Resource Summary 1997-98*

Direct Appropriation Revenue	\$11,614,000
External Revenue	\$4,498,000
Total Revenue	\$16,112,000
External to Total Ratio	27.9%
Operating Result	\$2,358,000
End of Year Cash Balance	\$2,831,000
Research Staff (EFT)	58
Total Staff (EFT)	135

*For explanatory notes see footnotes to Table on page 6

5. CSIRO Building, Construction and Engineering

Focus

CSIRO Building, Construction and Engineering operates to support, advance and improve the operation of industries relating to the built environment. Strategic research is focussed in three key areas - structural life cycle performance; intelligent construction systems; information and communication in construction - that will provide substantial advantage to Australia in the next century. Capabilities include design science/knowledge based systems, material performance, spatial optimisation and thermo-fluid engineering.

Outlook, Activities & Outcomes

- While appropriation income remains at the same level as in 1996-97, the Division aims to achieve a 7.9% increase in external income. Restructuring of the Division's support areas during 1996-97 will deliver cost savings in 1997-98. Most of the savings will be used to further develop the Division's research capability (principally staff and capital equipment). The remainder will be used to boost cash reserves needed to meet working capital requirements.
- The Division is increasing its expertise in the area of construction process re-engineering.
- The Division is working with building product manufacturers to identify opportunities within the new Building Code of Australia to innovate existing or introduce new improved building products.
- Energy efficient design software developed by the Division will be used to support the introduction of the National Housing Energy Rating Scheme (NatHERS) and the Building Energy Code of Australia (BECA).
- Completion of a collaborative project on the surface engineering of polymers will result in a unique and world leading technology to improve adhesion of paints and materials to currently inert polymers and polymeric substances. The process will be jointly marketed under licence to manufacturers of automotive components around the world.
- The Division is playing a major supporting role to the Fire Code Reform Centre, responsible for the development of new fire guidelines that will encourage innovative and flexible design while meeting strict safety requirements.
- Successful trials of route optimisation software to reduce road and rail construction costs is expected to lead to both domestic and overseas contracts that will provide a substantial return on research investment.
- The number of post-doctorate fellows recruited to the Division will be increased.
- New nuclear magnetic resonance equipment will become fully operational, giving added capability to several research areas including fluid dynamics.
- A rigorous review of opportunities for the whole built environment sector, including utilities, transport and construction, will be undertaken

to determine the future focus of the Division's research.

- Significant improvements to aluminium production processing equipment will be achieved using the computational and experimental approach to fluid dynamics.
- The Division will continue to build collaborative projects with Indonesia to develop relationships and increase potential for Australian research and organisations to be accepted into South East Asia.
- The Division will improve its customer and client focus through a project called 'Customer First' which aims to enhance our customer service on tactical research projects.

Planned Investment Profile

Sector	%
Built Environment	78.4
Mineral Processing & Metal Production	14.2
Chemicals & Plastics	6.3
Integrated Manufactured Products	1.1

Resource Summary 1997-98*

Direct Appropriation Revenue	\$18,130,000
External Revenue	\$9,768,000
Total Revenue	\$27,898,000
External to Total Ratio	35.0%
Operating Result	\$0
End of Year Cash Balance	\$1,040,000
Research Staff (EFT)	176
Total Staff (EFT)	256

*For explanatory notes see footnotes to Table on page 6

6. CSIRO Coal and Energy Technology

Focus

The major focus of CSIRO Coal and Energy Technology is to provide R&D which will improve the competitive advantage and environmental acceptability of the coal and energy industries. Research focuses on coal preparation and utilisation, gas utilisation, aspects of renewable energy and energy storage, and the environmental aspects associated with the coal and energy industries. In addition the Division provides significant contribution to CSIRO's broader environmental capabilities through its expertise in advanced analytical chemistry applied to both air and water quality.

Outlook, Activities & Outcomes

- Strengthening linkages with the coal industry remains paramount and the Division is undertaking a number of marketing initiatives which will raise its profile (and that of other CSIRO groups working in the coal area) to ensure a continued high share of the limited funding available from this industry.
- Restructuring of the Australian electricity industry and concerns over greenhouse are providing increased impetus for the Division to re-evaluate its priorities in the energy area and seek new opportunities to contribute to the sustainability of Australia's energy industry. Within this the Division is:
 - seeking closer ties with government and greater input into the technology aspects of policy development,
 - investigating renewed and broader involvement with the gas industry,
 - placing emphasis on energy storage and on energy production from biomass as key areas for development.
- The Division underwent a significant restructure during 1996-97 to enable it to better generate strategic research for the long-term future of its client industries as well as to meet current external income targets. This process will continue into 1996-97 with key actions being to develop a human resources strategy.
- Major activities in 1997-98 will be:
 - commencement of construction of a major gasification project (\$4.5million) at Pinjarra Hills: this will include development of staff capabilities in the area of advanced power generation
 - establishment of coal preparation facility on an industry site at Catherine Hill Bay, south of Newcastle
 - continuation of the commercial development of the turboflotation technology which is expected to greatly increase the efficiency of coal flotation and has potential in other industry sectors including minerals and wastewater.
 - commercialisation of the Division's new technology for the regeneration of transformer oils and simultaneous destruction of any PCB contaminants in the oil
 - commercial development of the CSIRO/White Industry technology for the production of ultraclean coal.

- commercial release by an industry partner of a 9 Wh/kg supercapacitor and development of a 12Wh/kg prototype.
- a major contribution to the management of minerals extraction and processing through determining the fate and behaviour of copper in waters downstream of several mines.

Planned Investment Profile

Sector	%
Coal & Energy	69.8
Climate & Atmosphere	10.2
Land & Water	8.8
Mineral Processing & Metal Production	5.1
Marine	4.4
Mineral Exploration & Mining	1.7

Resource Summary 1997-98*

Direct Appropriation Revenue	\$11,517,000
External Revenue	\$9,750,000
Total Revenue	\$21,267,000
External to Total Ratio	45.8%
Operating Result	\$-748,000
End of Year Cash Balance	\$1,376,000
Research Staff (EFT)	127
Total Staff (EFT)	185

*For explanatory notes see footnotes to Table on page 6

7. CSIRO Office of Space Science and Applications

Focus

The CSIRO Office of Space Science and Applications (COSSA), incorporating the Earth Observation Centre, is a semi-autonomous entity within CSIRO Mathematical and Information Sciences. The group conducts and facilitates internationally competitive and collaborative research and development in remote sensing science, space technology and data management. It contributes to seven sectors, with the major four being Exploration and Mining, Climate and Atmosphere, Marine, and Land and Water. COSSA has been given responsibility for implementing the Australian Government's new approach to the Australian space endeavour.

Outlook, Activities & Outcomes

- The Fedsat Satellite, to be launched in 2001, is the major platform of the Government's initiative in space endeavour, with a Cooperative Research Centre, if approved, expected to be the means whereby the satellite will be built, launched and operated. It is intended that CSIRO, industry, and universities would be members of the CRC, which the Head of COSSA would direct. A major activity will therefore be to establish the CRC and to transfer key staff into it.
- With the transfer of key staff to the CRC, an additional challenge will be to maintain an appropriate level of activity in providing links between CSIRO and national and international space-related science, technology and policy agencies. Active representation will continue on bodies such as the Committee on Earth Observing Satellites (CEOS), CEOS Working Groups, the Space Agency Forum and to major space agencies. COSSA will host the International Astronautical Federation World Congress during 1998.
- Through sector Component Research Plans and by working closely with other CSIRO units, the Earth Observation Centre will undertake research and develop products which are beyond the scope of single groups. A range of key tasks and leaders for the tasks have been identified. Tasks to be completed and evaluated during the year include: Phase 1 of Common Algorithms and Processing (CAPS), a common set of software tools incorporating best state-of-science; a Data Base of Environmental Time Series Data for archive, browse, storage and retrieval; Forest Biomass, using a combination of the historical Landsat MSS series and forest site based growth information to construct spatial time series of growth in NSW State Forests; Altimeter Validation, to provide information for the calibration and validation of TOPEX/Poseidon satellite altimeter data.
- The Centre recognises the need to plan for a renewable skills base through the nurture of young remote sensing scientists, and will continue to employ students on a part-time basis, and to encourage visits of overseas students. A Post-Doctoral or PhD student position will be funded by the Centre for the Marine Laboratories this year.
- The Access to Research Aircraft Facilities Program will continue to move towards synergy with the Earth Observation Centre. Three major campaigns for the Climate and Atmosphere, Exploration and Mining, Land and Water Sectors are projected for the year. Each campaign will be in collaboration with international scientific/space agencies.
- The merger with CSIRO Mathematical and Information Sciences (CMIS) will provide opportunities for more efficient and effective management of some science support functions. One major project already identified is for the installation of a compatible library database, to establish a link with the CMIS library, the National Library and the CSIRO library system.
- The Office aims to increase its external earnings by 5% at the end of the triennium.

Planned Investment Profile

<i>Sector</i>	<i>%</i>
Mineral Exploration & Mining	32.6
Climate & Atmosphere	29.6
Marine	19.8
Land & Water	9.5
Biodiversity	3.9
Radio Astronomy	3.2
Forestry, Wood & Paper Industries	1.4

Resource Summary 1997-98*

Direct Appropriation Revenue	\$2,488,000
External Revenue	\$620,000
Total Revenue	\$3,108,000
External to Total Ratio	19.9%
Operating Result	\$-468,000
End of Year Cash Balance	\$601,000
Research Staff (EFT)	11
Total Staff (EFT)	17

*For explanatory notes see footnotes to Table on page 6

Focus

CSIRO Entomology aims to generate economic, social and environmental benefits for all Australians through research into insects and their management. The Division's research focuses on understanding the role of insects and other invertebrates in the natural, urban and rural environments, developing safe and sustainable methods of pest and weed management, and using insects as models to understand fundamental biological processes. Our research contributes to ten Sectors with the bulk of our work targeted at supporting Australian rural industries, developing innovative manufactured products, and managing environmental issues.

Outlook, Activities & Outcomes

- A high priority in the rural sector is the management and ecology of pests, weeds and beneficial insects of field crops. This work focuses on developing strategies to manage major invertebrate and weed pests that have a significant economic impact on the pre-harvest productivity of field crops, pasture production and horticulture, and on reducing the current high dependence on environmentally harmful synthetic insecticides.
- A significant program focusing on the storage, handling and transport of grains - including cereal grains, pulses, oilseeds and similar commodities - both on-farm and in bulk handling systems, seeks to develop technologies that deliver products free of residues and without loss through pest damage.
- Engineered biopesticides are another promising alternative to chemical sprays. Our emphasis here is on creating genetically enhanced viral insecticides aimed at specific pests. We are also developing chemical and physical barriers for termite control, biological methods for cleaning up pesticide residues, and immunodiagnostic kits for pest detection and identification.
- By maintaining and developing the Australian National Insect Collection, the Division makes major contributions to knowledge essential for the preservation and management of biodiversity.
- As well as compiling an inventory of rare, threatened and endangered species, the Division is giving priority to studies of their genetics and population biology. The information gained will enhance understanding of Australia's biodiversity and assist in developing conservation plans.
- Key activities and outcomes for 1997-98 include:
 - A major assessment of the biodiversity information software developed by CSIRO Entomology to prepare plans for future development and enhancements.
 - Initiation of research into the ecology of *Helicoverpa spp.* in the Riverina to determine the relative importance of immigration and overwintering in regional population dynamics.
 - Large scale field testing of Metarhizium formulations for control of locusts and grasshoppers (in conjunction with the Australian Plague Locust Commission).
 - Pre-commercial field trials of kits based on two insect-specific monoclonal antibodies. (Collaboration with Abbott Laboratories).

- Production of extracts from 220 species of insects in formats suitable for screening by pharmaceutical companies.
- A \$3.6M mass rearing facility for screw-worm, Chrysomya bezziana, brought on-line in Kluang, Johor, Malaysia.
- Establishment of the seed beetle, Bruchidius villosus, on scotch broom at release sites in New South Wales.
- Evaluation of the potential of a rust fungus and crown fly in France for the biological control of saffron thistle.
- Development of management strategies for mimosa which integrate biological control with other control options.
- Establishment of a suitable commercial vehicle for the registration of carbonyl sulphide as a grain fumigant.
- Carry out further trials and design work for handling high moisture-harvested grains and legumes.

Planned Investment Profile

Sector	%
Field Crops	24.1
Chemicals & Plastics	21.7
Biodiversity	20.0
Meat, Dairy & Aquaculture	13.7
Horticulture	8.0
Pharmaceuticals & Human Health	4.1
Forestry, Wood & Paper Industries	3.2
Land & Water	2.5
Built Environment	1.6
Climate & Atmosphere	1.1

Resource Summary 1997-98*

Direct Appropriation Revenue	\$14,244,000
External Revenue	\$15,380,000
Total Revenue	\$29,624,000
External to Total Ratio	51.9%
Operating Result	\$-992,000
End of Year Cash Balance	\$-346,000
Research Staff (EFT)	233
Total Staff (EFT)	299

*For explanatory notes see footnotes to Table on page 6

9. CSIRO Exploration and Mining

Focus

CSIRO Exploration and Mining works with the exploration and mining industry to identify opportunities and deliver solutions through outstanding science and engineering. The Division's research spans the full spectrum of mining activities from primary exploration to mine site rehabilitation and mine safety. Core science areas for the Division include: processes governing mineralisation, rock alteration and landscape evolution; advanced instrumentation systems and interpretation of data for exploration, mining and environmental engineering; mechanics of geological excavation, extraction and materials handling processes; and control and optimisation of mining equipment and its interaction with the mining process.

Outlook, Activities & Outcomes

- The Division is developing a balanced research portfolio which applies the skills and capabilities of the Division primarily to the strategic research priorities of the Mineral Exploration and Mining Sector and the Coal and Energy Sector. Opportunities to collaborate with other groups in CSIRO and to extend activities into other sectors are also being examined.
- Specific marketing initiatives will focus on facilitating linkages with SMEs and other enterprises involved in the contracting of mining services and operations. Initiatives will also be undertaken to develop and enhance linkages with Commonwealth and state governments and agencies to further CSIRO's objectives and raise awareness of the benefits of CSIRO research.
- As a leading participant in four Cooperative Research Centres the Division will continue to foster closer ties between public and private sector research groups and to assist the uptake of new concepts and techniques by industry.
- The Division is seeking opportunities to support Australian companies operating overseas, particularly in South America, where the Division maintains an office on behalf of CSIRO in Santiago, Chile.
- The Division is working with the Deputy Chief Executives to complete negotiations with the Queensland Government for the development of Stage Two of the Queensland Centre for Advanced Technologies and with the Western Australian Government for the development of the National Centre for Petroleum and Mineral Resources Research.
- Specific research activities and outcomes planned for 1997-98 include:
 - Completion of the AUSTRALIS accelerator mass spectrometer, a unique micro-analytical facility capable of geochronological studies in a very large range of isotope systems.
 - Establishment of a multidisciplinary research group which will study magmatic hydrothermal systems and predictive mineral exploration and develop associated AMIRA collaborative research projects targeting, in particular, Pacific Rim copper/gold deposits.
 - Completion of the ARIES-1 satellite feasibility study and commencement of development of

the ARIES-1 system for improved global mineral exploration and mapping.

- Participation with World Geoscience Corporation in the CERBERUS project to develop the next generation of airborne geophysics exploration technology.
- Application to diamonds exploration of the geophysical and geochemical techniques which contributed significantly to the discovery of world class gold deposits in Western Australia.
- Development of advanced terrestrial photogrammetric systems for open pits and other mining and environmental engineering applications.
- Development of techniques to effectively cap uranium mine tailings dams to facilitate early environmental rehabilitation of mine sites.
- Advances in the adaptation of military-spec inertial navigation systems for the development of sensors to guide the operation of continuous mining equipment in highwall coal mining operations and the development of underground communication systems.
- Initiation of a pilot project on rapid roadway development in underground coal mines as part of a multi-million dollar agreement with the Coal Mining Research Centre of Japan.

Planned Investment Profile

Sector	%
Mineral Exploration & Mining	78.3
Coal & Energy	20.2
Petroleum	1.0
Mineral Processing & Metal Production	0.3
Marine	0.1

Resource Summary 1997-98*

Direct Appropriation Revenue	\$16,280,000
External Revenue	\$15,311,000
Total Revenue	\$31,591,000
External to Total Ratio	48.5%
Operating Result	\$814,000
End of Year Cash Balance	\$1,494,000
Research Staff (EFT)	167
Total Staff (EFT)	242

*For explanatory notes see footnotes to Table on page 6

Focus

CSIRO's multidisciplinary skill base and knowledge of the latest developments in food processing technologies are unique in Australia. As the locus of approximately 70% of CSIRO's food processing expertise, CSIRO Food Science and Technology works closely with a wide range of industries, including the dairy, meat, milling, baking, snack and fruit and vegetable processing industries, as well as with service providers to those industries, such as packaging, transport and storage companies. In association with other CSIRO Divisions in the Food Processing Sector, the Division offers research and technical services which solve problems for the food industry at every stage of the processed food business system, from analysing consumer needs to product design, through production optimisation, transport and storage, to marketing and retail support. Although its main focus is on the food processing industries, the Division also contributes to other Sectors, particularly Meat, Dairy and Aquaculture, Field Crops and Horticulture.

Outlook, Activities & Outcomes

- Effective from 1 July 1997, the Division plans to formally enter into a Joint Venture with the Victoria based Australian Food Industry Science Centre (AFISC). This collaborative venture will draw together AFISC's strong commercial focus and marketing capabilities, its successful industry training programs and modern pilot plant and laboratory facilities with CSIRO's powerful brand name, its strong intellectual property portfolio, outstanding scientific and engineering skills, and its established, committed relationships with the food industry.
- While the establishment of the Joint Venture will be the major activity in 1997-98, the Division also intends to strengthen its capabilities in other respects. In particular, the Division will:
 - build on its collaboration with the Division of Human Nutrition, particularly through the further development of a multi-Divisional Consumer Science Program;
 - develop new long-term projects within the Australian Cheese Technology Program, with a range of objectives that include the development of high order process control technologies for bulk cheddar cheese plants using artificial intelligence concepts;
 - revise its business strategies to ensure that its research programs continue to provide effective support to major meat industry customers following the industry restructuring announced by the Minister for Primary Industries and Energy in March 1997;
 - continue to develop 'Food into Asia' research projects with Australian companies;
 - contribute to the development of the Queensland Food Network, involving R&D establishments and tertiary institutions in the Brisbane region, with the aim of enhancing collaboration and optimizing research effectiveness;
 - establish post-doctoral fellowships and other studentships as a means of achieving a more effective balance between strategic and applied research;
 - explore options and develop plans for co-location and sharing of infrastructure and

services with other CSIRO Divisions;

- implement a Human Resource Management Plan aimed at ensuring that the Division can maintain its skill base and improve productivity in the future.
- The Division aims to increase external earnings from 35% in 1996/97 (budget) to 39% in 1997/98, with the overall aim of achieving the Food Processing Sector target of 45% in 1999/2000.

Planned Investment Profile

Sector	%
Food Processing	73.1
Meat, Dairy & Aquaculture	13.6
Chemicals & Plastics	5.0
Integrated Manufactured Products	4.6
Field Crops	1.9
Horticulture	1.7

Resource Summary 1997-98*

Direct Appropriation Revenue	\$14,611,000
External Revenue	\$10,236,000
Total Revenue	\$24,847,000
External to Total Ratio	41.2%
Operating Result	-\$466,000
End of Year Cash Balance	\$5,409,000
Research Staff (EFT)	148
Total Staff (EFT)	212

*For explanatory notes see footnotes to Table on page 6

11. CSIRO Forestry & Forest Products

Focus

CSIRO Forestry and Forest Products' mission is to increase economic and environmental benefit to Australia by improving the management and productivity of the nation's forests, and the quality and value of forest products. The Division assembles multi-disciplinary teams from its diverse skills base including quantitative and molecular genetics, silviculture, forest ecology, plantation management, wood science and technology, materials and adhesive technologies, chemical engineering, bioassays and biodeterioration, wood chemistry, fibre characterisation and pulpwood and fibre assessment. Research outcomes are delivered to forest owners and growers, contractors, sawmillers, wood and paper product manufacturers, timber designers, specifiers and users, development assistance agencies, policy makers and the community.

Outlook, Activities & Outcomes

- Wood and fibre demand is expected to grow strongly over the medium term, especially in the Asia-Pacific region. Improvements in Australia's competitiveness in this region will increase socio-economic and environmental benefits at both national and regional levels. Given this outlook, issues shaping our research program include the expansion of plantations - farm forestry, ecologically sustainable forest management, more efficient wood and fibre processing and prospects for new products and markets.
- Sustainable forest management and its demonstration are significant issues for forest industries. During 1997-98 research will assess possible sustainability indicators including elements of site productivity, adaptive management for a range of forest types and response of forests to increasing greenhouse gases. Research will focus on improving forest operations to reduce environmental impact and enhance economic performance, the sustainability of plantations for waste disposal, evaluation of new bleaching technologies and development of environmentally friendly wood preservatives and speciality chemicals.
- Consistent product performance is essential to establishing and maintaining markets. Planned outcomes directed at improving the quality and consistency of Australian woods include the identification of genetic markers linked to beneficial traits including wood density and fibre length for key plantation species, assessing the effects of silviculture on wood properties and developing improved processing practices for low quality wood for use in high value products.
- Adding value across the production chain is an imperative for industry. Research outcomes planned for 1997-98 include improvements to wood drying technologies, assessing Australian hardwood feedstock from various locations for a range of reconstituted and engineered products, evaluating cellulose pulps for rayon making, and evaluating fibre degradation processes during recycling.
- Improved customer focus based on marketing plans for key segments, workforce planning, organisational development and project evaluation are some of the key management areas to be

addressed in 1997-98.

Planned Investment Profile

Sector	%
Forestry, Wood & Paper Industries	74.1
Biodiversity	8.5
Built Environment	6.4
Land & Water	4.4
Chemicals & Plastics	4.0
Climate & Atmosphere	2.6

Resource Summary 1997-98*

Direct Appropriation Revenue	\$16,894,000
External Revenue	\$9,865,000
Total Revenue	\$26,758,000
External to Total Ratio	36.9%
Operating Result	\$-1,561,000
End of Year Cash Balance	\$5,820,000
Research Staff (EFT)	194
Total Staff (EFT)	274

*For explanatory notes see footnotes to Table on page 6

Focus

CSIRO Human Nutrition performs research and development to improve human well-being and community health in Australia while at the same time enhancing the competitiveness of the Australian food and food-related pharmaceutical industries. Research efforts focus on the major nutrition-related groups of diseases which account for most of the deaths, morbidity and the greater social and economic costs in Australia.

Outlook, Activities & Outcomes

- The CSIRO Division of Human Nutrition, established in 1975, is a major contributor to CSIRO's human health activities and one of the largest nutrition research and training centres in Australia. It has recently been consolidated onto a single site and is located in new and upgraded facilities on the University of Adelaide campus in South Australia.
- The Division's activities are set against the background of an increasing interest in the health potential of food as scientific evidence accumulates suggesting that there are classes of foods or constituents in foods that promote health. Outcomes of Divisional research have led to improved dietary recommendations in the public health arena and nutritionally-enhanced processed food products for local consumption and for the export market.
- The Division maintains strong relationships with the Australian-based food industry and the food-related pharmaceutical industries. It also interacts with the public sector in a variety of ways, providing advice and services on nutrition-related matters.
- The core research programs within the Division include Consumer Science, Functional Foods, Nutrition Linked Cancers and Bowel Health, and the CRC for Tissue Growth and Repair, supported by a clinic facility able to conduct human nutritional and intervention trials.
- A multidisciplinary and collaborative approach is maintained through the CSIRO Sector and Alliance process (principally with CSIRO Food Science and Technology and CSIRO Molecular Science), and extended by close association with the three South Australian Universities, as well as by participation in the CRC for Tissue Growth and Repair and in the newly formed Centre for International Nutrition in Adelaide.
- Recent research in the area of gut health has resulted in the development of a potential product designed to deliver key health-promoting short chain fatty acids to the large bowel. The product is currently undergoing full commercialisation in association with an Australian pharmaceutical company.
- An expanding interest in protective substances in plant foods has focused Divisional research on the importance of antioxidants in reducing the risk of cardiovascular disease and cancer. Mechanisms of protection are under investigation as well as the identification of specific plant antioxidants with the most health potential.
- The role of antioxidants in protection from free radical oxidation is an important area of research. We are investigating in collaboration with a commercial partner novel biomarkers of free radical stress which give an indication of free radical activity which may allow a more accurate determination of the overall protective effects of antioxidants.
- To advance the study of how food derived marine oils are acting as antiarrhythmic agents, a cellular model has been developed which allows a simulated heart attack to be produced in a single heart cell or group of cells. The protection afforded by various food substances, including fish oils, is being tested in this system and will bring us closer to understanding how these protective substances work.

Planned Investment Profile

Sector	%
Pharmaceuticals & Human Health	44.5
Food Processing	37.6
Meat, Dairy & Aquaculture	10.8
Field Crops	7.1

Resource Summary 1997-98*

Direct Appropriation Revenue	\$5,926,000
External Revenue	\$3,073,000
Total Revenue	\$9,000,000
External to Total Ratio	34.1%
Operating Result	\$-166,000
End of Year Cash Balance	\$1,942,000
Research Staff (EFT)	78
Total Staff (EFT)	94

*For explanatory notes see footnotes to Table on page 6

13. CSIRO Land and Water

Focus

CSIRO Land and Water aims to provide world class science as a sound basis for the management, conservation and sustainable use of Australian and international land and water resources. The Division advances and delivers a thorough understanding of the physical processes in the biosphere, develops innovative and relevant techniques and technologies, anticipates future research opportunities and responds to community and industry needs.

Outlook, Activities & Outcomes

- CSIRO Land and Water officially started operation on 1 February 1997, following the amalgamation of the Divisions of Soils, Water Resources and the Centre for Environmental Mechanics. With over 480 staff based in Adelaide, Albury, Atherton, Brisbane, Canberra, Griffith, Perth and Townsville, the Division is well placed to solve environmental problems spanning the land-water-atmosphere continuum. Major research activities and expected outcomes in the six major research areas identified by the Division include the following.
- Sustainable Catchment Management: Tested sets of catchment health indicators; guidelines for land and catchment managers to control nutrient and sediment movement in catchments, determination and incorporation in policy of community perceptions of beneficial change (eg community management of irrigation areas).
- Environmental Processes and Resources: Predict continental-scale responses of the Australian biosphere to change and variability in climate and land use; develop new methods for land resource assessment, and ensure better implementation of existing methods across Australia; develop improved land use systems based on better understanding of the impacts of management on the soil water balance; understand and predict the effects of trees on landscape productivity and function; complete a major expansion of effort in wind resource mapping and wind farm placement.
- Groundwater Management and Site Remediation: Commercialisation of on-line monitors for volatile organic compounds; investigation and remediation of contaminated soils and groundwater; development of better methods for groundwater management and assessment of vulnerability to pollution; improvement of minesite rehabilitation and reduction of environmental impacts; evaluation and demonstration of aquifer storage, recovery and reuse of stormwater and wastewater.
- Sustainable Agriculture: Reinventing agriculture in dry areas of Australia to achieve genuinely sustainable farming systems; the establishment of a National Irrigation Research Centre to, amongst other outcomes, take irrigation into the tropics; maximising production in fertile areas; uptake by the NSW EPA of Swagman Destiny, a water salinity balance program that predicts productivity over the ensuing 10 to 20 years.
- Tropical Soil and Water Management: Improve the understanding of dryland acidification and produce acidification risk maps for rangelands in Northern Queensland; develop and apply methods to assess soil constraints impacting on sugarcane yield; development of management techniques to maintain biodiversity and sustainable production of timber and other forest products from plantations.
- Urban and Rural Water Management: Demonstration of aquifer storage and re-use of stormwater and sewage effluent; assessing the effects of reservoir management techniques on nutrient dynamics and algal growth; defining the sources and movements of sediment and phosphorus across landscapes and down rivers; establish the effect of pesticide residues on yabbies; assess the effectiveness of various carp control techniques.

Planned Investment Profile

Sector	%
Land & Water	48.8
Field Crops	14.7
Biodiversity	6.4
Built Environment	5.3
Mineral Exploration & Mining	4.4
Climate & Atmosphere	3.7
Forestry, Wood & Paper Industries	3.6
Horticulture	3.3
Petroleum	2.8
Marine	2.4
Coal & Energy	1.9
Meat, Dairy & Aquaculture	1.9
Mineral Processing & Metal Production	0.7
Wool & Textiles	0.1

Resource Summary 1997-98*

Direct Appropriation Revenue	\$27,754,000
External Revenue	\$14,741,000
Total Revenue	\$42,495,000
External to Total Ratio	34.7%
Operating Result	\$51,000
End of Year Cash Balance	\$2,590,000
Research Staff (EFT)	290
Total Staff (EFT)	453

*For explanatory notes see footnotes to Table on page 6

14. CSIRO Manufacturing Science and Technology

Focus

CSIRO Manufacturing Science and Technology supports Australian manufacturing industry through the development and exploitation of innovative materials, processes, products and services. Its science and technology foci range from materials development, processing and characterisation, electrochemical technologies, micromanufacturing, plasma and laser processing, joining and cutting technologies, surface engineering through to pervasive technologies like automation and real time systems, photonics and intelligent manufacturing systems which are broadly important to many industry sectors. The majority of effort is directed at the needs of the Integrated Manufactured Products sector, with significant involvement in a further 8 sectors - particularly in the minerals and energy area.

Outlook, Activities & Outcomes

- CSIRO Manufacturing Science and Technology formally commenced operation on 1 July 1997 when the former Division of Manufacturing Technology and the Division of Materials Science and Technology merged. A major goal and challenge in 1997-98 will be to successfully integrate the operations of the division in a way which minimises disruption to ongoing research projects, is equitable to staff, builds an effective divisional team culture, and strengthens both the strategic research capacity and the relevance of the new business unit's research activities to the industry sectors it serves.
- The primary objectives of the new division are to:
 - undertake world class research in materials and systems for product and process development;
 - understand the market and customers' needs;
 - give effective customer service and support the transfer of technology to the marketplace;
 - address both incremental advancement and radical breakthrough in its research;
 - utilise its interdisciplinary team capabilities to most effectively conduct research and deliver its outcomes;
 - develop a business environment in which fiscal responsibility will focus on the achievement of a sustainably balanced budget.
- CSIRO Manufacturing Science and Technology currently is geographically spread across 4 states operating at 6 sites. Apart from the planned closure of the Preston site and the relocation of activities to Clayton, it is planned to review the long term needs of the Division to determine whether there will be further site rationalisation.
- The appropriation budget for CSIRO Manufacturing Science and Technology is roughly equivalent to that of the two former Divisions. The new Division is budgeting for an operating surplus in 1997/98 and in each of the out-years of the triennium. In addition a small increase in capital equipment and infrastructure expenditure and in external income is forecast.
- CSIRO Manufacturing Science and Technology is working with customers to ensure that the Australian Light Metals initiative is supported by providing leading design skills

and processing technology to ensure that Australian manufacturing industry, particularly the automotive part producers, transforms the base metal into value-added elaborately transformed manufactures for sale in the global marketplace.

- CSIRO Manufacturing Science and Technology is introducing several leading edge scientific developments into the marketplace and is developing effective commercialisation plans to ensure significant Australian benefit and effective protection of CSIRO technology.

Planned Investment Profile

Sector	%
Integrated Manufactured Products	67.7
Coal & Energy	9.5
Chemicals & Plastics	7.6
Mineral Processing & Metal Production	5.8
Mineral Exploration & Mining	4.4
Services	2.1
Built Environment	1.9
Food Processing	0.9

Resource Summary 1997-98*

Direct Appropriation Revenue	\$25,865,000
External Revenue	\$17,251,000
Total Revenue	\$43,116,000
External to Total Ratio	40.0%
Operating Result	\$1,367,000
End of Year Cash Balance	\$-1,285,000
Research Staff (EFT)	236
Total Staff (EFT)	326

*For explanatory notes see footnotes to Table on page 6

15. CSIRO Marine Research

Focus

As Australia's largest marine science agency, the charter of CSIRO Marine Research is to provide the scientific basis for the sustainable development of Australia's marine resources and to understand the ocean's role in climate. A diverse skill base enables the creation of multi-disciplinary teams on projects that span all elements of the marine environment. The main research focus is directed toward the Marine Sector, providing scientific knowledge for the use and conservation of marine resources to enable development of Australia's oceans, seas, estuaries and dependant industries which is environmentally and economically sustainable. Significant research contributions also are delivered to the Climate and Atmosphere, Meat, Dairy and Aquaculture, Biodiversity, and Petroleum Sectors.

Outlook, Activities & Outcomes

- The Division commenced operation on 1 February 1997 when the Division of Fisheries merged with the Division of Oceanography. Significant change has occurred. Nine research Programs have merged to become five, creating a more integrated research approach. Two support Programs aim to deliver streamlined services to research Programs. Consolidation of Program structures will continue in 1997- 98.
- A new strategic planning framework to prioritise the Division's research, allocate resources and ensure alignment with Sector needs, will be implemented and a 3 to 5 year Strategic Plan agreed.
- External earnings of 33.6 percent are expected. The client base will be expanded in line with Sector needs.
- The Division will provide advice to the Commonwealth Government in development of the Oceans Policy and the Marine Science and Technology Plan.
- A strategy for the efficient use of both CSIRO's ocean-going research vessels in the context of a national marine research fleet will be developed in collaboration with relevant government agencies.
- The Division will play a leading role in the ongoing development and marketing of CSIRO's research effort for the Marine Sector, and will facilitate implementation of the Sector Plan.
- Educational and promotional activities for the International Year of the Ocean will occur in collaboration with other marine agencies.
- The scientific principles and requirements underpinning sustainable multiple use management will be developed; sustainability indicators and criteria will be provided for State of Environment Reporting.
- The final report of a 5-year study of the effect of trawling on the Great Barrier Reef will be delivered to the Great Barrier Reef Marine Park Authority and a study of the recovery of the seabed environment from the impact of prawn trawling will commence.
- Stock assessments and management strategy advice will provide the scientific base for Australian input to the International Commission for the Conservation of Southern Bluefin Tuna.

- Genetic markers will be applied to selective breeding programs for prawns and oysters; and refined prawn diets will be developed that are cost effective, nutritious and environmentally friendly.
- Studies of nutrients in coastal waters will assist in the management of sewage release, and minimise the environmental impacts of the aquaculture industry.
- Development of a risk assessment framework for ballast water discharges will minimise the introduction of species while maintaining a viable shipping industry.
- Uncertainty in greenhouse scenarios will be reduced through significantly improved climate change models.
- Climate prediction systems for Australia are being developed in collaboration with CSIRO Atmospheric Research and the Bureau of Meteorology.

Planned Investment Profile

Sector	%
Marine	66.9
Climate & Atmosphere	14.5
Meat, Dairy & Aquaculture	10.1
Biodiversity	5.3
Petroleum	3.2

Resource Summary 1997-98*

Direct Appropriation Revenue	\$19,941,000
External Revenue	\$10,100,000
Total Revenue	\$30,041,000
External to Total Ratio	33.6%
Operating Result	\$-1,382,000
End of Year Cash Balance	\$4,298,000
Research Staff (EFT)	213
Total Staff (EFT)	303

*For explanatory notes see footnotes to Table on page 6

16. CSIRO Mathematical and Information Sciences

Focus

CSIRO Mathematical and Information Sciences has particular expertise in computer science and engineering, applied mathematics, operations research, statistics and related disciplines. Our research and service delivery areas include datamining, simulation and scheduling, computational fluid dynamics, digital media systems, remote sensing, image analysis, expert systems, human-computer interaction, software engineering and environmental monitoring. The generic nature of the Division's knowledge base means its research can be applied to the solution of "real-world" problems across most industry sectors. While our primary focus will be the IT&T and Service sectors, we will continue strong interactions with the manufacturing, mineral processing, mineral exploration and mining, agriculture, infrastructure, environment, marine and food processing sectors.

Outlook, Activities & Outcomes

- CSIRO Mathematical and Information Sciences commenced operation in November 1996 when the Division of Information Technology merged with the Division of Mathematics and Statistics and the former Biometrics Units. A major challenge in 1997-98 will be to integrate the activities of these groups in a way which enhances the new Division's capacity to meet the needs of Sectors to which it is committed, ensures it is able to achieve an appropriate level of external income and minimises staff disruption and uncertainty.
- The Division plans to appoint a new Human Resources Manager to develop a strategic HR capability with a key focus on workforce planning, performance management systems, change management and flexible reward systems.
- In 1997-98, the Operations Research Group will start a strategic research effort on personnel rostering. An application has been lodged for support from DIST, and the work is planned to take place in collaboration with Time and People Australia and the NSW Police.
- The software package Fastflo, developed by the Division, is expected to be distributed world-wide in a collaboration with the Numerical Algorithms Group (UK).
- Technologies which support the acquisition, generation and maintenance for complex online information repositories will be developed and demonstrated.
- A system for classifying, routing and archiving documents will be trialled with a public records office and associated government agencies.
- An early version of a software tool that assists software developers in understanding complex computer programs will be completed. The tool develops high level information models of the software and uses visualisation techniques in innovative ways to display these models.
- The Division will formalise collaborative relationships with major research groups in Australia at DSTO and the University of Queensland (Centre for Software Maintenance and Software Verification Research Centre).
- Software for broadband access to digital media

archives and for a novel integrated suite of online multimedia services will be developed and demonstrated.

- The Division will collaborate with CSIRO Marine Research in stock assessment for key Australian fisheries. The Division will improve the reliability of estimates for Southern Blue Fin Tuna by explicit modelling of spatio-temporal variation, and deliver new techniques for assessing growth rate, natural mortality and fishing mortality for major species of the Northern Prawn Fishery.
- A prototype imaging system for the automatic recognition of melanomas will be delivered to a commercial partner, Polartechnics.
- Results of a study on detecting fraud in databases of transaction records will be delivered to a commercial partner.

Planned Investment Profile

Sector	%
IT & Telecommunications	45.7
Services	18.8
Integrated Manufactured Products	13.1
Mineral Processing & Metal Production	5.2
Land & Water	3.6
Built Environment	2.9
Mineral Exploration & Mining	2.6
Marine	2.2
Food Processing	1.3
Others*	4.7

*Others includes Petroleum; Field Crops; Meat, Dairy & Aquaculture; Biodiversity; Forestry, Wood & Paper Industries; Wool & Textiles; Horticulture; Climate & Atmosphere; and Pharmaceuticals & Human Health.

Resource Summary 1997-98*

Direct Appropriation Revenue	\$23,061,000
External Revenue	\$7,917,000
Total Revenue	\$30,978,000
External to Total Ratio	25.6%
Operating Result	\$-1,777,000
End of Year Cash Balance	\$3,163,000
Research Staff (EFT)	174
Total Staff (EFT)	239

*For explanatory notes see footnotes to Table on page 6

17. CSIRO Minerals

Focus

CSIRO Minerals is CSIRO's major contributor to the Mineral Processing and Metal Production Sector. The strategy for this Sector is directed to research and technology development to assist in sustaining competitive mineral processing and metal production industries. Activities are broadly directed towards (i) licence-to-operate issues such as the implications and solutions of environmental, health and safety issues (ii) continuous and radical improvements to technologies for economical mineral extraction and metal production and (iii) new or value-added resource utilisation.

Outlook, Activities & Outcomes

- There is likely to be strong demand for Australian minerals and metals throughout 1997-98 with continued emphasis on low cost production and improved environmental performance. The Division, through the sector process, is well placed to provide a wide-ranging specialist service in relevant research and technological developments.
- The development of new systems methodologies for environmental impact assessment in mineral and metal processing by the Division will make available scientific advice from which informed options can be generated by governments and industry.
- The Division will continue to provide specialist support for the development of a direct iron making industry in Western Australia and a magnesium metal industry in Queensland.
- The Division is working with the industry on the development of new hydrometallurgical routes for mineral extraction. During 1997-98 it will expand initiatives in biological extraction of minerals.
- Mineralogical analysis is difficult and time consuming. During the year, the Division will be releasing its new generation QEM*SEM automated mineral phase analyser and commercial units will be placed within Australian and overseas mining companies.
- The Division will continue to make productive contributions to the G K Williams CRC for Extractive Metallurgy, the A J Parker CRC for Hydrometallurgy and the CRC for New Technologies for Power Generation from Low Rank Coals.
- The Division expects to make innovations in the extraction of valuable minerals from fine base-metal ores and the recycling of aluminium dross.
- During the year, the Division will close its laboratories at Port Melbourne and relocate the staff to new laboratories at Clayton. This will bring the staff at Clayton to around 250.

Planned Investment Profile

Sector	%
Mineral Processing & Metal Production	87.5
Coal & Energy	11.5
Petroleum	0.9

Resource Summary 1997-98*

Direct Appropriation Revenue	\$19,808,000
External Revenue	\$14,065,000
Total Revenue	\$33,873,000
External to Total Ratio	41.5%
Operating Result	\$107,000
End of Year Cash Balance	\$1,264,000
Research Staff (EFT)	200
Total Staff (EFT)	294

*For explanatory notes see footnotes to Table on page 6

Focus

CSIRO Molecular Science is a centre of excellence for biological and chemical research. Its mission is to generate benefits for Australia by assisting the development of industries in the Chemicals and Plastics and the Pharmaceuticals and Human Health Sectors of the Australian economy. There are also smaller but significant contributions to the Integrated Manufactured Products, the Built Environment and the Petroleum Sectors.

Outlook, Activities & Outcomes

- The Division was formed in July 1997 by the merger of Chemicals and Polymers with Biomolecular Engineering. The new entity provides a broad research base with expertise in molecular and cellular biology; protein science; organic, polymer, process and computational chemistry; colloid and interface science and waste management technology. This combination of skills enhances CSIRO's ability to address the needs of a number of industry sectors. A challenge for management will be to achieve integration of expertise and facilities in a manner which minimises disruption to ongoing programs and is equitable to staff. Research priorities will, in the short term, remain consistent with the objectives of the former Divisions, although an investigation of opportunities in biosensors, therapeutics and fermentation technologies arising from the merger has already been foreshadowed.
- The scientific foci of the Division are:
 - design and synthesis of small molecules and polymers with specific properties,
 - structure, function and engineering of proteins with application to human health,
 - control of genetic and cellular mechanisms for human health benefits,
 - design of processes for water and wastewater treatment and cleaner production, and
 - transformation of laboratory chemical processes to prototypes and pilot plants.
- Planned industry outcomes are crop protection products, polymers and composites, engineered packaging, inorganic materials and membranes, specialty chemicals, cleaner production and disposal, pharmaceuticals, diagnostics and medical devices.
- Divisional management is based on the need to deliver commercial outcomes while maintaining a strong scientific base. The Division will review its research portfolio to ensure that resources are optimally applied to industry needs and sectoral issues. Commercial strategies to provide 35% external funding of our operations will be implemented. Estimated external earnings for the financial year are \$10M.
- There are several significant commercial outcomes expected in the near future. A number of new products resulting from the Dupont/CSIRO Strategic Alliance in Engineered Resins, including a polymer-based printing ink expected to dominate world sales, will enter the

market. Commercial launches of the RACOD Meter and the Continuous Microwave Reactor will occur during 1998. The influenza drug, Zanamavir, being developed by Biota and Glaxo Wellcome is in phase-3 clinical trials and could be returning royalties by the year 2000. Similarly, drug delivery technology being developed with FH Faulding and Company Ltd has reached the clinical trial stage. An extended wear contact lens capable of setting new performance benchmarks has been developed through the CRC for Eye Research and Technology.

- The Division has modern laboratories at Clayton and Parkville and an older laboratory at North Ryde. A priority is to replace the North Ryde laboratory with a new chemical and biological research facility at Riverside Corporate Park. This laboratory will be shared with the Division of Food Science and Technology to allow maximum integration and sharing of research infrastructure and to facilitate research collaboration.

Planned Investment Profile

Sector	%
Pharmaceuticals & Human Health	59.1
Chemicals & Plastics	32.2
Built Environment	7.0
Integrated Manufactured Products	1.4
Petroleum	0.4

Resource Summary 1997-98*

Direct Appropriation Revenue	\$24,489,000
External Revenue	\$10,187,000
Total Revenue	\$34,676,000
External to Total Ratio	29.4%
Operating Result	\$466,000
End of Year Cash Balance	\$964,000
Research Staff (EFT)	238
Total Staff (EFT)	318

*For explanatory notes see footnotes to Table on page 6

19. CSIRO Petroleum Resources

Focus

CSIRO Petroleum Resources was established in 1993 with a view to capturing the benefits to be gained by integrating skills in geomechanics, numerical modelling, stress measurement and geology with the Petroleum industry. Our primary aims are to convert strategic research activities into new technologies, to introduce or adapt emerging technologies for the benefit of Australia or Australian based companies, and to facilitate contributions to the petroleum industry from other CSIRO Divisions. Application of the results of this work will be within the petroleum, coal and mining sectors.

Outlook, Activities & Outcomes

- Emphasis will be given this year to ensuring that the Division has in place new structures and processes developed last year after a significant change in approach to research management and support. The Division has recently contracted most of its administrative support requirements to other CSIRO Divisions. The effectiveness of the outsourced services will be monitored and assessed to determine their effectiveness and any need for additional changes.
- As a result of the Sector process, CSIRO has the opportunity to expand its research capacity and capability in the Petroleum Sector. Growth will be dependent in part on securing additional earnings from external sources. Divisional strategies to explore that path in 1997-98 include scoping the potential for developing more advanced 'measurement-while-drilling' methods, exploring methods of reducing formation damage, and initiating discussions on the development of information systems.
- Following agreement in principle with Curtin University, development of a joint geophysical capability to address research requirements of the petroleum industry should commence this year.
- Business Plans will be consolidated in the context of Sector plans and the agreed growth framework. Emphasis will be on a target product and service portfolio, capability development (people, facilities and finance), location, and key research and company relationships.
- As part of the strategy to secure longer term support for research activities, the Division will continue to explore relationships with Australian and international research institutions and with operating and service companies. The objectives are to enter into treaties of cooperation which provide the basis for forming industry consortia to jointly fund relevant research proposals.
- Following negotiations between CSIRO and the Western Australian Government, the Board has acknowledged strategic value in a proposal to establish a National Centre for Petroleum and Mineral Resources Research in Perth. In 1997-98, the Division will continue to support this initiative, with a focus on strengthening relationships with petroleum industry operating and service companies.
- Relatively mature technologies from research in the Exploration and Appraisal area, such

as carbon isotope stratigraphy and strontium chronostratigraphy will be marketed internationally, particularly in southeast Asia. Emerging technologies such as chemostratigraphy, and fluid inclusion/laser microprobe technologies will be marketed commercially, and as collaborative research projects, with appropriate intellectual property protection.

- Commercialisation and marketing of products in the Drilling and Completions area will be advanced with completion of commercial and research agreements on drilling fluids research with two major international companies.
- Development of fracture models to better analyse stimulation of coal gas and petroleum reservoir interests will continue in collaboration with Intera Consultants.
- The Division has won support from ACARP, BHP and Shell for a study of gas outbursts in underground coal mines. Development of a model to enable coupling of the factors affecting outbursts is planned for completion this year.
- In the Reservoir Management area, strategic research is focussed on improving the efficiency of recovery from petroleum reservoirs. Objectives this year include exploring application of the Levy model to properties of sedimentary rock, and the development of a network model to generate three-phase relative permeability.

Planned Investment Profile

Sector	%
Petroleum	94.5
Coal & Energy	5.3
Mineral Exploration & Mining	0.2

Resource Summary 1997-98*

Direct Appropriation Revenue	\$5,518,000
External Revenue	\$4,672,000
Total Revenue	\$10,190,000
External to Total Ratio	45.8%
Operating Result	\$810,000
End of Year Cash Balance	\$-271,000
Research Staff (EFT)	56
Total Staff (EFT)	69

*For explanatory notes see footnotes to Table on page 6

Focus

CSIRO Plant Industry carries out strategic and tactical research in the plant sciences to make agri-food and fibre and horticultural industries profitable and sustainable, develop novel plant products and improve natural resource management. Our major focus is on production efficiency and reliability while maintaining the resource base, with increasing emphasis on meeting product quality related objectives in the processing and manufacturing sector. Our research also contributes to conservation of biodiversity, improved plant productivity in the forestry sector, and implications of global atmospheric change for natural and agricultural ecosystems.

Outlook, Activities & Outcomes

- On 1 July 1997 the Divisions of Horticulture and Plant Industry merged, the combined operations to be known as CSIRO Plant Industry. The former Divisions had similar objectives and capabilities, the major difference being in the industries served. Horticulture will maintain an identifiable focus within the combined Division, and increased emphasis is anticipated in tropical horticulture research.
- CSIRO Plant Industry is committed to development of new and improved plant products and their management within sustainable production, processing and value-adding systems. Powerful new methods of biological enquiry now allow us to address product quality features as well as efficiency in production and processing systems.
- As new opportunities for agricultural and horticultural production arise, we are confronted with a serious diminution of our productive capacity through erosion, spreading salinisation and increasing soil acidity, exacerbated by persistent drought in much of eastern Australia. It is essential that we understand the structure and dynamics of our agro-ecosystems so that we can achieve sustainability from our production units, maintaining critical soil and water resource bases and conserving the associated biodiversity resource.
- Intellectual property development will be increasingly important for CSIRO Plant Industry, both to establish Australia's opportunities for market control and to lever advantage in bargaining for the use of overseas-owned proprietary technologies.
- Plant Industry has contributed to the delivery of the first commercial genetically engineered crop in Australia through development of INGARD cottons. A number of genetically engineered agricultural and horticultural food crops originating from Plant Industry are expected to enter domestic and international markets over the next few years.
- In tandem with these advances we are developing new tools and strategies to enhance technology transfer. We recognise the crucial importance of adoption of management strategies for new and improved crops and pastures, including guidelines for environmental quality and sustainability.

To this end we are increasing emphasis on incorporation of management strategies into simulation models and decision support systems.

- CSIRO is committed to raising public awareness of the value and role of science and technology to Australia's future. Plant Industry has been integral in the planning and facilitation of the CSIRO Discovery Centre, a showcase for the organisation's research to the Australian people and overseas visitors. Building will commence at the Black Mountain laboratories in 1997-98. Sponsored by Optus Communications and the ACT Government the Centre will be completed during the second half of 1999.
- Discussions on rationalisation of research support services for Divisions on the Black Mountain Site are being held to facilitate the implementation of an efficient and cost effective support structure.

Planned Investment Profile

Sector	%
Field Crops	36.8
Horticulture	22.1
Meat, Dairy & Aquaculture	10.0
Wool & Textiles	9.8
Biodiversity	7.7
Food Processing	7.7
Forestry, Wood & Paper Industries	2.3
Climate & Atmosphere	1.9
Chemicals & Plastics	0.9
Integrated Manufactured Products	0.8

Resource Summary 1997-98*

Direct Appropriation Revenue	\$29,127,000
External Revenue	\$15,940,000
Total Revenue	\$45,066,000
External to Total Ratio	35.4%
Operating Result	\$-1,053,000
End of Year Cash Balance	\$4,715,000
Research Staff (EFT)	378
Total Staff (EFT)	504

*For explanatory notes see footnotes to Table on page 6

21. RV Franklin (A National Facility)

Focus

The RV Franklin is a National Facility owned and operated by CSIRO to provide a world class ocean-going research platform for use by the Australian marine research community. Its strategic operations are jointly managed by the Division of Marine Research and an independent National Facility Steering Committee. Franklin's operations are fully supported by specialised electronic, data processing, chemical analysis and other scientific and technical services provided by the Division of Marine Research. A range of containerised and demountable equipment provides the capability to undertake research in the fields of physical, chemical and biological oceanography and some aspects of marine geosciences.

Outlook, Activities & Outcomes

- During 1997-98 the National Facility will conduct fourteen cruises in support of the research programs of Commonwealth and State agencies (CSIRO, AIMS, ANSTO and the Victorian Marine and Freshwater Resources Institute), sixteen Australian universities and collaborating scientists from the US, Canada, Japan and New Guinea.
- Operations will occur in temperate and tropical waters from the Southern Ocean, the Great Australian Bight, Bass Strait and the Tasman Sea to the Coral Sea, the Gulf of Papua, Torres Strait and the Bismark Sea. Research will be conducted in fields as diverse as crustal tectonics, sedimentology, riverine-coastal dynamics, ocean transport and dynamics, climatology, fisheries management and biological productivity.
- The Strategic Plan will be implemented, considering and responding as appropriate to emerging national marine research priorities and the requirements of Australian marine researchers and agencies.
- The National Facility Steering Committee will provide independent advice to the development of Australia's Marine Science and Technology Plan, including the strategy for the operation of Franklin in the context of a national marine research fleet.
- A National Marine Scientific Equipment Inventory will be established and promoted to enhance the capabilities and co-ordination of Australia's marine research effort.
- The Franklin will participate in activities coordinated by HOMA for the International Year of the Ocean.
- Equity of access will continue to be offered to Australian marine researchers and agencies to conduct high quality marine research through the development and promotion of Franklin's equipment, capabilities and procedures.

Planned Investment Profile

<i>Sector</i>	<i>%</i>
Marine	100.0

Resource Summary 1997-98*

Direct Appropriation Revenue	\$4,209,000
External Revenue	\$430,000
Total Revenue	\$4,639,000
External to Total Ratio	9.3%
Operating Result	\$-536,000
End of Year Cash Balance	\$434,000
Research Staff (EFT)	0
Total Staff (EFT)	10

*For explanatory notes see footnotes to Table on page 6

22. CSIRO Telecommunications and Industrial Physics

Focus

CSIRO Telecommunications & Industrial Physics' engineers, physicists and technical staff offer innovative commercial solutions to research and development problems for the telecommunications, security, manufacturing, mining, energy, processing and medical industries. The Division is positioning itself to maximise benefits to Australian industry by ensuring that it addresses industry's immediate technology needs whilst maintaining a long-term, adaptable strategic research base.

Outlook, Activities & Outcomes

- CSIRO Telecommunications & Industrial Physics formally commenced operation on 6 September 1996 when the former Division of Radiophysics merged with the Division of Applied Physics. A major goal and challenge in 1997-98 will be to achieve integration of the Division's skills and research to the maximum benefit of current and prospective customers in line with Sector plans.
- The Australian telecommunications industry is undergoing enormous change brought about by deregulation, technological changes and rapid growth (12%pa for the last five years). Whilst supporting current customers in areas such as millimetre-wave systems for multi-point distribution services and emergency mine communication systems, the Division will focus on establishing linkages with multinationals and their Australian alliance partners who are targeting broadband networks and radio based telecommunications. The Division continues to build on its strengths in the enabling technologies of antennas, microwave and millimetre wave systems and integrated radio circuits. Looking forward to the future and responding to industry demand, the Division is developing relevant capabilities in the emerging Asynchronous Transfer Mode and network services.
- In the Integrated Manufacturing Products Sector our work in instrument prototyping and process control is supporting both manufacturing and production companies. Important activities will include the delivery of prototype instruments for safety, detection and extraction in the mining industry, optics for defence and space applications and metering of both gas and liquid and flow. Major improvements are expected in surface coating processes for the tool manufacturing industry and methods for non-destructive testing of advanced structural materials.
- In the Services Sector, the Division's expertise in image acquisition, interpretation, transmission and storage is applied directly to the health services, security and defence industries. A computer based system will be developed to assist radiologists to analyse breast screening X-rays; SQIS™ face recognition technology will be applied to problems such as the automatic verification of passport photographs, searching police 'mug-shot' databases and access control; and underwater 'acoustic vision' will be developed for mine identification.
- The Division's National Measurement Laboratory is to become a National Facility with responsibility for maintaining Australia's physical standards of measurement and for providing calibration services and support for the national measurement system. The NML also has developed a competitive advantage in metrology in the Asia/Pacific region and is working with countries including Indonesia, Vietnam and the Philippines, to eliminate technical barriers to trade through the development of mutual standards and conformance.
- The Division's involvement in the other Sectors is generally as part of collaborative projects with other Divisions. In particular, the Division is looking for new opportunities in power and energy as that industry undergoes deregulation and major changes.
- The largest involvement in the CRC program relates to Molecular Engineering and Technology Centre which undertakes research in molecular sensing and medical diagnosis techniques.
- The Division aims to increase its external earnings by 15% in 1997-98.

Planned Investment Profile

Sector	%
IT & Telecommunications	31.8
Measurement Standards	22.8
Integrated Manufactured Products	20.9
Services	10.9
Built Environment	4.5
Mineral Exploration & Mining	2.5
Climate & Atmosphere	2.0
Coal & Energy	1.8
Chemicals & Plastics	1.6
Wool & Textiles	0.9
Petroleum	0.3

Resource Summary 1997-98*

Direct Appropriation Revenue	\$35,995,000
External Revenue	\$12,445,000
Total Revenue	\$48,440,000
External to Total Ratio	25.7%
Operating Result	\$239,000
End of Year Cash Balance	\$4,816,000
Research Staff (EFT)	310
Total Staff (EFT)	447

*For explanatory notes see footnotes to Table on page 6

23. CSIRO Tropical Agriculture

Focus

CSIRO Tropical Agriculture provides options and solutions for northern Australian agriculture and related natural resource systems. The region's principal agricultural industries - beef cattle, sugar, and dryland cotton and grains - have three common concerns. These are to increase the efficiency of production, to improve the quality and hence the international competitiveness of their products, and to ensure that their production systems are ecologically sustainable. The Division takes a strong systems approach in addressing the R&D needs of these and other industries (eg the rapidly developing aquaculture industry). In doing so, it draws on a very broad range of skills and disciplines, ranging from molecular biology to natural resource economics.

Outlook, Activities & Outcomes

- The Division of Tropical Crops and Pastures and the Division of Tropical Animal Production merged in October 1996 to form CSIRO Tropical Agriculture. Its major foci in 1997-98 will be to integrate and consolidate the research activities of the two groups, and to address more closely the unfolding priorities of the seven Sectors to which it contributes.
- Tropical Agriculture will, in 1997-98, give considerable attention to the quality and relevance of its science. It will do so by reviewing several of its major research areas. The reviews will consider whether the research is of world class standard, whether there is an appropriate balance between strategic-basic and applied research, and whether it is relevant and appropriately supported by the Division's clients - be they industry, the community or governments.
- The Division plans to increase its external earnings by about four per cent. This increase is expected to come from the sugar and grains industries, and from groups supporting sustainable resource management. The restructure of the policy, marketing, and R&D agencies for the meat industry is expected to create severe problems for the Division through delays in the flow of R&D funds for work relevant to the Meat, Dairy, and Aquaculture Sector.
- During the year, the Division will rationalise and restructure its Research Support Program. Initially, this will deal with human resources, finance, information services, marketing services, and research support at the Davies Laboratory (Townsville) and the Rendel Laboratory (Rockhampton). Later, the Division will also restructure the remaining research support projects concerned with major infrastructure items. These include extensive plant and animal facilities at six locations, and four research stations. Substantial cost savings in research support are achievable from both activities. The Division will also make a major contribution to planning and decision making relating to the location of a new laboratory in Brisbane.

Planned Investment Profile

Sector	%
Meat, Dairy & Aquaculture	56.7
Field Crops	27.0
Land & Water	7.4
Wool & Textiles	2.7
Biodiversity	2.5
Climate & Atmosphere	2.3
Marine	1.3

Resource Summary 1997-98*

Direct Appropriation Revenue	\$19,567,000
External Revenue	\$11,272,000
Total Revenue	\$30,839,000
External to Total Ratio	36.6%
Operating Result	\$-146,000
End of Year Cash Balance	\$5,127,000
Research Staff (EFT)	221
Total Staff (EFT)	325

*For explanatory notes see footnotes to Table on page 6

Focus

The Division's focus is terrestrial ecology. With a broad range of ecological and biological disciplines it tackles national resource management issues which require a strategic research foundation. Recognising that decisions about conservation of biodiversity are tightly linked with other decisions about land use, its research is particularly focussed on producing tools which assist policy makers and land managers to integrate the competing values of production and conservation.

Outlook, Activities & Outcomes

- The Division is increasing its emphasis on research in the agricultural zone of southern and western Australia where conservation and production needs are greatest. To this end, a program restructure will be implemented on 1 July 1997, followed by extensive external consultation at federal, state and regional levels to determine specific project objectives. The Division's laboratory at Helena Valley, WA will be relocated to Floreat Park, facilitating a closer relationship with CSIRO's Centre for Mediterranean Agricultural Research.
- The Natural Heritage Trust is likely to have a considerable impact on research directions and on the Division's external funding. Conversely, the Division has substantial relevant expertise to contribute to developing Trust programs. Strategies for maintaining a productive relationship between federal and state governments and the Division over Trust issues are being developed.
- About half the staff at the Division's headquarters in Canberra will relocate to new and refurbished buildings during the year. The improvements will greatly support interactions between people working on related projects and between project and central support staff.
- The CRC for Biological Control of Vertebrate Pest Populations, which the Division hosts and in which we have a major involvement, will undergo its fifth-year review in July. Maintaining funding for this innovative approach to one of Australia's major conservation problems is a challenge for the Division. Specific deliverables from the Vertebrate Pest Program this year include determination of the level of sterility required in rabbits to significantly reduce population size; completion of field work on mice which addresses the same question; and analysis of two years' impact of rabbit calici virus on the rabbit-fox-cat relationship at one intensive field monitoring site.
- The need for meaningful and reliable indicators of biodiversity is an emerging issue for federal, state and local agencies which must monitor and report on the state of the environment. In July, the Division will establish a new research project on this area, linking it closely with current CSIRO work on other environmental indicators.
- In July, the Division will coordinate a national conference to consider how indicators of the quality and sustainability of life

might be improved, particularly by considering environmental and social indicators in concert with economic indicators. The conference, "Measuring national progress: Is life in Australia getting better, or worse?", is sponsored by CSIRO, the ABS and the National Citizenship Project.

- The Division and other Australian collaborators will trial the use of "BioRap", a new toolbox of technologies, to identify a set of priority areas for conservation in Western NSW and Papua New Guinea.
- A methodology for developing predictors of regional attributes which contribute to successful regional tourism will be developed and trialled by the end of 1997. The Division coordinates the CSIRO Multi-Divisional Program on Tourism Research.
- A LWRRDC project on the impact of disturbance on the plants and soils of tropical savannas will be completed. The results will have considerable predictive power across northern Australian savannas.

Planned Investment Profile

Sector	%
Biodiversity	54.2
Land & Water	13.3
Wool & Textiles	9.0
Meat, Dairy & Aquaculture	8.4
Field Crops	7.2
Climate & Atmosphere	2.8
Marine	1.8
Mineral Exploration & Mining	1.4
Forestry, Wood & Paper Industries	1.3
Coal & Energy	0.5
Services	0.3

Resource Summary 1997-98*

Direct Appropriation Revenue	\$14,530,000
External Revenue	\$8,128,000
Total Revenue	\$22,658,000
External to Total Ratio	35.9%
Operating Result	\$0
End of Year Cash Balance	\$3,063,000
Research Staff (EFT)	156
Total Staff (EFT)	240

*For explanatory notes see footnotes to Table on page 6

25. CSIRO Wool Technology

Focus

CSIRO Wool Technology serves the Wool and Textiles Sector and provides social and economic benefits to industry and the community through research focussing on the development of advanced technologies for the wool, textiles, and leather industries. Research areas range from the specification of raw wool, to finished wool fabric, to production of hides, skins and leather with minimal impact to the environment. The emphasis is on ensuring sustainable production at all levels. The Division has a wide range of multidisciplinary skills capable of servicing wool, textiles and leather at national and international levels. We are recognised as the world's leading wool research laboratory supporting Australia's third largest earner of export revenue.

Outlook, Activities & Outcomes

- Significant changes continue to evolve in the relationship with our major stakeholder, the International Wool Secretariat (IWS). We have developed a new, compact research portfolio emphasizing industry/IWS/CSIRO joint involvement and more rapid delivery to market of research outcomes.
- We will implement further changes to our direction in keeping with IWS and the Wool and Textiles Sector Advisory Committee advice to optimise the balance of research, technology development and commercial adoption, support for industry and moves to diversify beyond wool. Projects will range from strategic research on the fibre surface as a basis for development of innovative processes and products, to fabric preparation and finishing.
- The Division will diversify its funding base by seeking projects directly from industry including short term product development in accordance with Sector Advisory Committee recommendations. To this end, interaction with early stage processors and machinery manufacturers will move further towards strategic alliance through consultancy agreements, secondments, collaborative research programs and regular forums to explore new directions and initiatives. Early stage processors in Australia will be significant players.
- The closure of the IWS pilot plant facilities in England provides an opportunity for the Division to enhance its facilities and to pursue product development activities to complement the proposed formation of an Australian Fibre and Textiles Education Centre (previously Natural Fibres Institute) in Geelong.
- Major technologies which are due to be commercialised in 1997/98 include Weavable Singles, Modified Wool, Sportwool and SALFA (a salt-free hide pickling process).
- A new instrument for the rapid, accurate measurement of fibre bundle strength and software package for the prediction of spinning performance and yarn properties will be trialed under collaborative agreements in five mills in Europe and three in Asia.
- The Division's Leather Research Centre will continue to direct increased resources towards the

later stage processing of finished leather from wet-blue, especially with respect to improved polymer adhesion.

- A major new three year project, "Innovation in Leather Making", will commence in 1997-98 with the involvement of four major Australian tanning companies.

Planned Investment Profile

Sector	%
Wool & Textiles	100.0

Resource Summary 1997-98*

Direct Appropriation Revenue	\$11,563,000
External Revenue	\$11,597,000
Total Revenue	\$23,160,000
External to Total Ratio	50.1%
Operating Result	\$-810,000
End of Year Cash Balance	\$9,867,000
Research Staff (EFT)	147
Total Staff (EFT)	252

*For explanatory notes see footnotes to Table on page 6

Focus

The Chief Executive and four Deputy Chief Executives, collectively CSIRO's Executive Committee, provide high level strategic leadership, business development, performance review and management of the Organisation. The Chief Executive is accountable to the CSIRO Board for the total performance of the Organisation. The Deputy Chief Executives are accountable to the Chief Executive for the performance of Chiefs and their Divisions and for the performance of Sector Coordinators and the operation of Sector processes. They are also responsible for the oversight of areas of corporate support, for major sites and their development, for fostering cross-Divisional collaboration, for CSIRO's performance in a group of Sectors, and for promoting CSIRO through internal and external interactions.

Outlook, Activities & Outcomes

- While a measure of stability has been brought to CSIRO's appropriation funding situation, particular challenges facing the Organisation in 1997-98 are to reverse the downturn in external funding experienced in 1996-97; to ensure that the potential gains from Divisional mergers are realised; and to build on the promising start to operation of the Sector Advisory Committees.
 - The Executive will continue to guide Divisions through merger processes and the transition to a Sector-Division matrix mode of operation with a view to maximising collaborative research opportunities and creating financially strong and well-focussed business units.
 - Building on the recent decisions on strategic research directions for the triennium commencing 1 July 1997, the Executive will promote continued development of a balanced portfolio of research and development which utilises CSIRO's core strength in strategic research to address key national requirements and deliver outcomes which focus on customer and stakeholder needs within all Sectors.
 - The Executive will ensure that the principles of the Sector process are clearly established and communicated, and that the Sector-based functions of marketing, commercialisation and communication are clarified and put into operation.
 - There will be further development of an integrated framework of policy and processes for leadership, career and team development in CSIRO, focussing on the behaviours and skills required for collaborative, cross-functional and multi-disciplinary team performance to enhance CSIRO delivery to the Sectors.
 - The Executive will focus on building high level strategic relationships with key customers, collaborators and stakeholder groups by maintaining frequent interaction with senior government, industry and community representatives in order to
 - ensure that CSIRO has access to the best advice and can make effective contributions to government and industry decision making, particularly through the Sector Advisory Committees
- identify, assess and implement appropriate strategic responses to significant current and emergent changes nationally and internationally
 - secure more realistic funding arrangements with the R&D corporations and government agencies.
- Where consistent with CSIRO's strategic directions, further opportunities for development of more effective collaboration between CSIRO and other research agencies will be pursued, and existing relationships will be assessed.
 - The Executive will ensure CSIRO's adherence to all legal requirements and Board policies.

Resource Summary 1997-98*

Direct Appropriation Revenue	\$6,623,000
External Revenue	\$205,000
Total Revenue	\$6,828,000
External to Total Ratio	3.0%
Operating Result	\$-19,000
End of Year Cash Balance	\$-19,000
Research Staff (EFT)	7
Total Staff (EFT)	35

*For explanatory notes see footnotes to Table on page 6

27. Corporate Support Units

Focus

The challenge for CSIRO's Corporate Support units is to operate in the most efficient manner possible to promote organisational cohesion and facilitate the research and development activities undertaken by CSIRO's Divisions. Further streamlining of Corporate Support activities is expected in 1997-98 following a significant reduction during 1996-97. Rationalisation is being achieved partly by devolution of responsibilities to Divisions and partly by cessation of activities no longer considered warranted in the light of the pressure on resources brought about by the continuing application of efficiency dividends to funding for non-core activities. Of central importance to the Corporate Support units in 1997-98 will be their role in developing policies and processes to facilitate and consolidate the mergers between CSIRO's Divisions and the shift to a Sector-Division mode of operation. Passage of the Commonwealth Authorities and Companies Bill due to take effect from 1 July 1997 will also have significant implications for the work of a number of corporate units.

In the following entry, a statement of the focus of each corporate unit is followed by a selection of specific activities and outcomes planned for 1997-98.

Corporate Executive Office

The Corporate Executive Office provides integrated support to the Board, Chief Executive, Deputy Chief Executives and Divisions to assist them in the efficient conduct of their business in the areas of policy development, interaction with Ministers and government departments/agencies, international matters, the public awareness and promotion of science, school education activities and the provision of an enquiry service for the public and industry. The Office provides briefing or action advice on meetings, correspondence and events involving the Chairman, Board members and Chief Executive, and is responsible for the coordination and management of Board and Executive meetings.

Government Business provides a central contact point, coordination, analysis and quality control for CSIRO's corporate interactions with the Minister for CSIRO, other Ministers as appropriate, Government departments and other parts of the Australian R&D system. Specific activities and outcomes include:

- Coordination and management of CSIRO's negotiations on Government policy issues such as triennium funding and competitive neutrality. Liaison with Government Departments and agencies, and other parts of the research system to provide input on issues relevant to CSIRO and achieve collaboration when appropriate. Provision of regular summaries of a wide range of policy issues and inquiries to alert senior staff to opportunities for input relevant to their areas. Preparation or coordination of corporate input to external inquiries which arise during 1997-98.
- Coordination or provision of timely and high quality Ministerial briefings and correspondence; briefing of Ministerial staff in portfolios with a major interest in R&D. Arrangement of meetings with Parliamentary Committees and coordination of briefings for them in areas identified as priorities by the Government; coordination of visits of Parliamentarians to CSIRO sites.
- Provision of briefings for the Chief Executive, particularly for participation on high level councils and committees and for meetings with

portfolio Ministers. Awareness of national and international developments in S&T policy and provision of advice to senior staff when relevant to CSIRO.

International Scientific Liaison supports CSIRO's corporate and statutory responsibilities in relation to international matters. Specific activities and outcomes include:

- Provision of advice and support for the development of corporate policy on international matters. Review and administration of CSIRO's international S&T agreements. Strengthening of CSIRO's liaison with Departments and agencies on international matters.
- Fostering of CSIRO's contributions to international scientific and technical cooperation. Provision of briefings for high level meetings and coordination of CSIRO's interface with visiting delegations. Provision of a corporate focus for development of activities with selected countries. Awareness of country developments, dissemination of information to Divisions and provision of opportunities for Divisional staff to share information and experience in international activities. Facilitation of activities under funded S&T agreements. Maximisation of the benefits of aid-related activities, including through provision of training placements and R&D related courses. Support for the CSIRO Indonesia Committee, the Australian Steering Committee on Collaboration for S&T Australia/Indonesia, and the Commonwealth Science Council.
- Maintenance and enhancement of the international activities database, for various corporate applications such as identifying potential new linkages of advantage to CSIRO. Exploration of its integration/relationship with the contracts database/project management system.

National Awareness Program seeks to achieve increased national awareness of CSIRO's research activities, particularly via the media; improved industry awareness of the benefits of research; and enhanced political awareness of the importance of science and the contribution of CSIRO. Specific

activities and outcomes include:

- Consolidation and expansion of media coverage of CSIRO scientific achievements; an 89% increase in print media coverage favourable to CSIRO.
- Consolidation of high quality National Science Briefings in federal Parliament and extension to State parliaments.
- Development of the program for industry and national media using a network of professional science writers delivering major articles to influential publications.
- Preparation and delivery of the CSIRO Annual Report according to Parliamentary legislation and new regulations in the proposed Commonwealth Authorities and Companies Act. Completion of the redesign and development of CSIRO's Internet pages (WWW) for public access.

Science Education Programs provide specialised resources for teachers and students of science to promote excellence in teaching and enthusiasm in the discovery of science. Specific activities and outcomes include:

- Targets for 1997-98 are 100,000 students/teachers attending CSIROSEC sessions, 19,000 members of CSIRO's Double Helix Science Club and 21,000 audited circulation of The Helix magazine, 350 students in the CSIRO Student Research Scheme, 3,500 students achieving CREST Awards and 1,000 student entries in the BHP Science Awards.
- Achievement of ongoing external funding for the CREST project and for a new junior science magazine, *Scientriffic*.

CSIRO Enquiries is a national telephone enquiry service with capacity to handle more than 40,000 enquiries per year. It offers a specialised information and referral service to the general public, industry, students, teachers, government and researchers. Specific activities and outcomes include:

- Consolidation of centralised operations in Clayton and of a national telephone number to allow people across Australia to access the service for the cost of a local telephone call.
- Consolidation of the Divisional Liaison Program whereby Information Officers interact with Divisions and Industry Sector personnel to ensure that information given in response to enquiries is accurate and current.

Corporate Finance

The Corporate Finance Branch provides advice and services to support financial planning and financial management within CSIRO. It also specifies and implements financial systems to meet the Organisation's needs. Specific activities and outcomes include:

- Support for the Chief Executive and Board through the development of financial planning

options for the current triennium that are consistent with the Organisation's priorities.

- Improvement of financial planning and management in CSIRO by working with Divisions to improve budgeting, accounting and management practices, especially in the areas of costing, pricing and project accounting.
- Preparation of the Organisation's financial data for Federal Budget documentation. In partnership with the Government Business unit, development of the related triennium funding agreement.
- Development of financial performance reports for Executive Committee and the Board. Production of CSIRO's statutory financial reports. Facilitation of Audit Committee review and Board approval.
- Development and promulgation of financial policies and procedures relevant to CSIRO's business and statutory requirements.
- Support and development of UNIBIS and financial reporting systems.
- In partnership with Corporate Information Technology Services, development, implementation and subsequent support of a project accounting system and associated management reports to meet the needs of project managers in Divisions and the Organisation's sector planning and reporting process.
- Initiation and management of major Organisation-wide contracts (eg insurances, travel), where there are benefits in so doing.

Corporate Human Resources

Corporate Human Resources provides strategic leadership through the provision of advice and the development of processes and policies that will maximise the contribution of staff to the achievement of CSIRO goals. Specific activities and outcomes include:

- Further improvements to the performance management process in CSIRO.
- Further improvements to employee relations arrangements.
- Provision of high quality HR and non-commercial legal advice to the Executive and Divisions.
- Implementation of the agreed occupational safety, health and environment strategy.
- Implementation of a remuneration system plus a recognition and rewards program that focuses on performance and rewards corporate behaviours.
- Finalisation of a competency framework for use by line managers.
- Development of improved workforce planning processes and tools.
- Conduct and analysis of a CSIRO-wide staff survey to gauge levels of commitment and

27. Corporate Support Units

- concerns about employment arrangements and the working environment.
- Formulation of a strategic legal compliance program and development of specific control systems including environmental, privacy and conflict-of-interest.
- Corporate Property**
- Corporate Property Branch provides a corporate property management service to ensure adequate and cost effective accommodation and facilities. Specific activities and outcomes include:
- Revision of the Property Management Plan 1997-2000 to include strategies such as rationalisation and consolidation of specific sites; the development of joint State/CSIRO initiatives; recognition of emerging Sectoral priorities; and evaluating industry and other research establishments capital investment benchmarks.
 - Implementation of the approved Property Management and Capital Investment Plans; and the management of CSIRO's internal leasing scheme for accommodation.
 - Management of the North Ryde redevelopment and facilitation of projects recently submitted to the Parliamentary Public Works Committee (PPWC).
 - Successful completion of "added value" processes for the Maribyrnong and Ryde sites.
 - PPWC approval to be sought for Stage II at Pinjarra Hills, Queensland.
 - Implementation of a process to capitalise the inherent value of the Glenthorne site.
 - Negotiations to be finalised for the new Petroleum/Minerals resources complex at Bentley, Western Australia.

Information Technology Services

Information Technology Services provides and maintains CSIRO's corporate network infrastructure for transmission of voice, data and image Australia wide; supports the Unix operational environment for corporate applications; maintains and develops corporate applications systems including the pay, human resources, finance, contracts and project support systems; provides library and information management services; and develops corporate strategic plans for information technology, networks, telecommunications and information management. A current challenge is to ensure that CSIRO's information technology needs continue to be met with appropriately skilled staff in the context of the outsourcing model proposed by the Office of Government Information Technology. Specific activities and outcomes planned for 1997-98 include:

- Continuation of the corporate infrastructure equipment rolling upgrade to enhance responsiveness to users.

- Planning for rationalisation of IT capability for more effective delivery across the Organisation.
- Planning of architecture for a single IT systems log-on across the Organisation utilising the Microsoft NT domain model.
- Enhancement of IT security by testing and implementing firewall technology at major sites.
- Investigation of Microsoft Exchange as an Organisational messaging system.
- Delivery of the CSIRO Project Support System starting October 1997 and its general acceptance without major disruption to the Divisions by June 1998.
- Completion of a technical assessment of the human resources applications by July 1998 with a view to rationalising technical platforms.
- Implementation of the Year 2000 date changes in the human resources applications (for completion by December 1998).
- Provision of expert technical and systems advice and, where required, development and implementation of cost effective solutions in consultation with relevant system owners, Divisional staff and the Executive.
- Continuation of the PABX replacement program, and further integration of voice and data networks utilising AARNet, Regional Network Organisations and the Virtual Private Network.

Risk Assessment and Audit

Risk Assessment and Audit conducts a comprehensive audit program approved by the Chief Executive and endorsed by the Audit Committee. The program focuses on safeguarding of assets, compliance with internal policy and external regulations, integrity of information, and effectiveness and efficiency of operations. The Unit also assesses risks (other than those associated with the success of research) and evaluates controls in high and significant risk areas. Operations will be performed with due consideration to the adoption of a new three year strategic risk assessment and audit plan commencing 1997-98; training programs designed to improve risk awareness and control consciousness; and the introduction of self assessment tools and techniques to assist management in the identification, evaluation and treatment of risks. Specific activities and outcomes include:

- Updating risk assessments to ensure that managers focus on issues that are critical to the continuing success of the Organisation and where potential for improvement is the greatest.
- Ensuring the adequacy of the control infrastructure by conducting audits designed to test compliance with internal policies and procedures and external regulations.
- Providing assurance on the integrity of management information systems.

- Developing cost effective control strategies to reduce the level of risk exposure for high and significant risks.
- Raising the awareness of staff in risk identification techniques and cost effective control procedures by facilitating education and training workshops.

Strategic Planning and Evaluation

Strategic Planning and Evaluation promotes and facilitates a strategic approach to planning and evaluation at all levels of CSIRO; provides or locates planning and evaluation services for CSIRO managers; coordinates the Sector planning process; and coordinates the preparation of corporate planning and evaluation documents. A particular challenge is to maintain the momentum of the new Sector planning process to achieve the revitalisation of CSIRO as a single entity serving the diverse sectors of the Australian economy. Specific activities and outcomes include:

- Monitoring of developments in implementation of Sector processes and facilitation of Organisational learning and capture of best practice.
- Initiation of a major project to assess value creation by CSIRO and demonstrate the returns on investment in R&D.
- Preparation of the final report on the trial of Performance Indicators, and the annual CSIRO Operational Plan. Preparation of planning and performance information for federal budget documentation and the CSIRO Annual Report.
- Provision of relevant national and international data on a consolidated Sector basis.
- Preparation and provision of data on CSIRO's research effort in response to internal and external needs.

Training and Development

The Training and Development unit provides corporate policies and advice on leadership, career and team development and provides learning opportunities for staff at significant, career transition points. Specific activities and outcomes include:

- The Leadership Development Program to assist senior staff and to support succession planning.
- The Team Development Program to encourage learning about team effectiveness, particularly in relation to multi functional and multi disciplinary teams.
- Research Management Courses for staff moving into program or functional management roles
- Project Leadership Courses for staff moving into research project leadership roles.
- Leadership in R&D courses (in collaboration with the Business/Higher Education Round Table) for leaders of multi organisational teams in universities, the private sector, public sector research agencies and Cooperative Research Centres.

- Consultancy services to Divisions on leadership and team development.
- Research on the effectiveness of R&D teams and leaders.

Legal Network

Through a complement of qualified legal practitioners at the Executive and Business Unit levels of the Organisation and quality external legal providers, the Legal Network ensures the provision of accurate, timely and practical legal input to CSIRO's management. Increased external interest on CSIRO's management and compliance systems is expected with the passage of the Commonwealth Authorities and Companies Bill due to take effect from 1 July 1997. Specific activities and outcomes include:

- Development of strong strategic corporate governance and compliance programs in relation to matters including the environment, competition, conflicts of interests and privacy.
- Continued strong emphasis on provision of quality and practical commercial advice to support CSIRO's commercialisation efforts.
- Strengthening of the network of CSIRO lawyers.
- Preparation and maintenance of CSIRO's preferred form of agreement and support in negotiating standard form contracts with major clients including research and development corporations.
- Provision of legal advice and related services to Chiefs, Business Managers and other research managers on legal aspects affecting their business units particularly in relation to commercialisation.
- Provision of legal advice to the Board, the Executive and General Managers on their roles and responsibilities including compliance with legislation and general law.
- Management of litigation on behalf of CSIRO.
- Facilitating access to legal information and materials through further development of the CSIRO Legal website.
- Establishment of electronic corporate registers to support corporate governance systems.
- Decentralisation of legal services and improvement of outsourcing arrangements through monitoring of CSIRO Legal Panel relationships.

Corporate Commercial Group

The Corporate Commercial Group facilitates development of a coordinated customer focus throughout the organisation. The Group promotes relationships which enable CSIRO to meet its national obligations through its work with industry and government agencies; assists CSIRO Divisions to achieve best practice in the transfer of research results into processes and products in the market; and advises the Executive Committee on policy and processes related to the commercial activities of

27. Corporate Support Units

the Organisation. Specific activities and outcomes include:

- Support the CSIRO Commercial Committee in the development and implementation of CSIRO's commercial policy and adoption of best practice throughout the Organisation.
- Implement induction and training programs, workshops and conferences for CSIRO staff which will enhance the Organisation's performance in the commercial area.
- Facilitate the operation of networks amongst CSIRO personnel operating in the commercial area.
- Develop a marketing policy for the Organisation.
- Develop and implement a CSIRO Service Charter.
- Revise the CSIRO Commercial Practice Manual to reflect changes in the Organisation and in the commercial environment in which the Organisation operates.
- Maintain the Organisation's Contracts Data Base.
- Establish an Organisation wide system of account management which facilitates interaction between the Organisation and its major and key customers.
- Review the management of Intellectual Property within the Organisation.

CSIRO Publishing

CSIRO Publishing operates within CSIRO on a commercial basis to publish quality science for both Australian and overseas markets in four major product categories - primary research journals, academic & reference, education & general and CSIRO services - for a broad range of customers from research institutions to schools. Specific activities and outcomes include:

- Publication and distribution of 95 issues of 14 primary research journals to customers world wide. Full text on line delivery will become a reality in 1998 to complement paper versions that are still the mainstay of the subscription base.
- Publication of over 30 new academic reference titles in both print and CD formats with an increasing emphasis on products with international appeal and overseas sales potential.
- Continued publication of *Ecos*, CSIRO's Science and the Environment Magazine, and a major relaunch of *Rural Research* magazine to improve communication and technology transfer to the Agribusiness sectors.
- Increased focus on customers in schools and home markets with development and publication of 6 - 8 new multimedia CD- ROM and print products.
- Provision of commercially-priced contract services to CSIRO including multimedia support, audio visual media clips and internal CSIRO products such as the Diary and Laboratory Manual.

Resource Summary 1997-98*

Direct Appropriation Revenue	\$34,139,000
External Revenue	\$7,124,000
Total Revenue	\$41,263,000
External to Total Ratio	17.3%
Operating Result	\$5,527,000
End of Year Cash Balance	\$2,256,000
Research Staff (EFT)	0
Total Staff (EFT)	276

*For explanatory notes see footnotes to Table on page 6

Our Purpose

We serve the Australian community through outcomes which provide:

benefit to Australia's industry and economy

environmental benefit to Australia

social benefit to Australians

support to Australia's national and international objectives

through excellence in science and technology, and in the provision of advice and services.