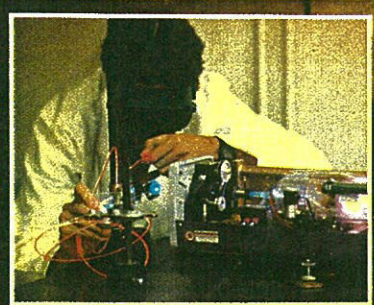
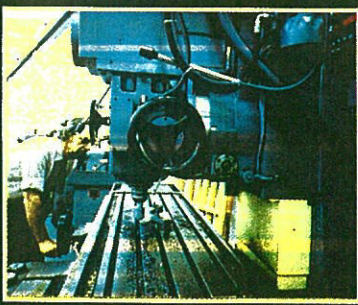
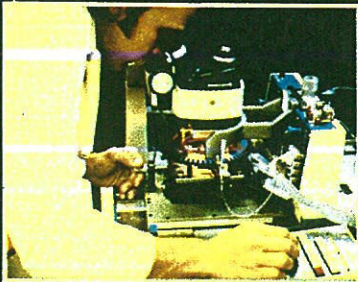
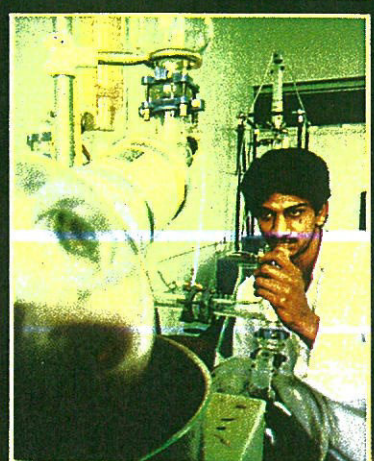
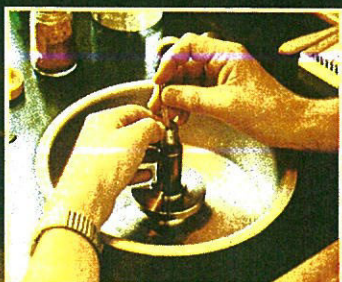
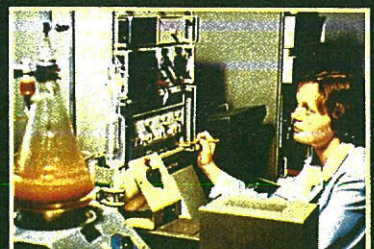
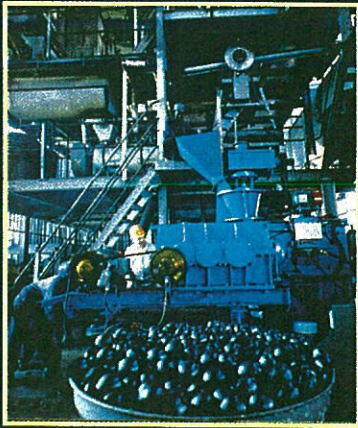




Annual Report

1986



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Council for Scientific and Industrial Research

Annual Report

1986

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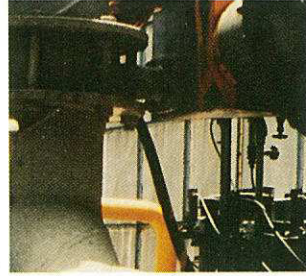
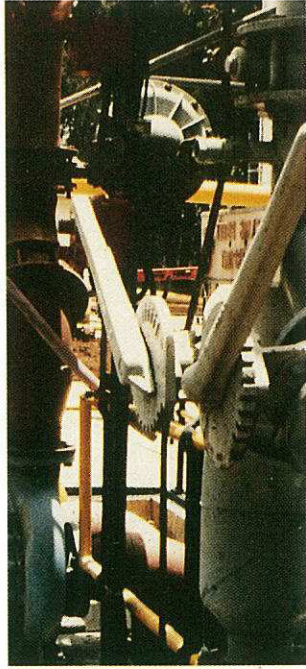
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This Annual Report differs from those of previous years. It has been considerably shortened and is supplemented by a regular publication entitled *Impact*. This represents a selection of CSIR R&D projects successfully implemented in the marketplace or in the process of being industrialized.

More detailed information on the work of the CSIR can be obtained from the annual reports of individual institutes.

Cover: The CSIR – partner to industry



Council members



DR C F GARBERS

Chairman – President, CSIR



MR M T DE WAAL

Managing Director and Chief Executive, Industrial Development Corporation of South Africa Ltd

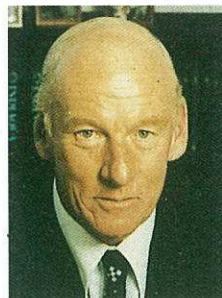


PROF. D S HENDERSON

Principal and Vice-Chancellor, Rhodes University

Professor Henderson holds a Ph.D. degree in Applied Mathematics from Harvard University. He has worked for both the Anglo American Corporation of South Africa and the IBM Corporation in Poughkeepsie. He was the first Professor of Computer Science in South Africa at the Computing Centre, University of the Witwatersrand. He was also Head, Department of Applied Mathematics, and Dean of the Faculty of Science at the same university before he took up his present position at Rhodes University.

Mr De Waal obtained his B.Sc.(Civ. Eng.) degree from the University of Stellenbosch and is a registered Professional Engineer. He was Town Engineer of Bellville from 1947 to 1960. In 1961 he joined the Industrial Development Corporation of South Africa. In 1970 he became General Manager, then Managing Director in 1980 and finally Chairman in 1986. He serves on the board of directors of several major companies and is a member of various statutory and advisory councils.



DR H B DYER

Managing Director, De Beers Industrial Diamond Division (Pty) Ltd

Dr Dyer obtained his Ph.D. from the University of Cambridge for his research into solid-state physics. He was awarded the Doctorate of Science, *honoris causa*, by the University of the Witwatersrand. He started his professional career in 1951 with the De Beers Diamond Research Laboratory and became Head of the Laboratory in 1962. In 1971 he became Managing Director of De Beers Industrial Diamond Division. He is on the Main Board of Directors of De Beers Consolidated Mines and holds the chair or directorships in a number of other companies.

member of the University Council. He was awarded the Havenga Prize for Biology by the Suid-Afrikaanse Akademie vir Wetenskap en Kuns in 1980 and an honorary doctorate by the Potchefstroom University for CHE in 1982.



PROF. O W PROZESKY

Department of Medical Virology, Institute of Pathology, University of Pretoria

Professor Prozesky obtained his M.D. degree in 1968 from the University of Pretoria and became a registered Specialist Pathologist (Clinical and Medical Microbiology). At the University of Pretoria he has held the positions of Chief Specialist/Professor and Head, Department of Medical Microbiology, Professor in Virology, Professor and Head, Department of Medical Virology, Director of the Institute of Pathology, Associate Dean (part-time) of the Faculty of Medicine. He is now Vice-Rector, Academic, for the Natural Sciences. He is a member of several statutory councils and committees.

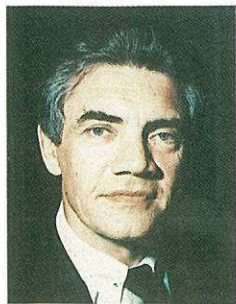


PROF. H P VAN DER SCHIJFF

(Retired during the year)

Professor Van der Schijff obtained his D.Sc. (cum laude) from the Potchefstroom University for CHE for his work on the plant ecology of the Kruger National Park. Since 1956, when he joined the University of Pretoria as a lecturer, he held the positions of Professor and Head, Department of Botany, Dean of the Faculty of Science, Vice-Rector and

Council members



MR W P VENTER

Executive Chairman, Altron/Altech Group

Mr Venter qualified in the Engineering Division of the Department of Posts and Telecommunications and is a Chartered Engineer (UK). He joined Standard Telephones and Cables SA (Pty) Ltd and later became Group Marketing Manager. In 1965 he formed Allied Electric (Pty) Ltd to establish the first South African controlled electronics, telecommunications and electrical company. The Altech Group now comprises six companies.

University of the Witwatersrand and the University of Pretoria respectively. He joined Sasol in 1952, became General Manager in 1970, Chief Executive in 1976, Managing Director in 1977 and Deputy Chairman in 1981. He holds the degrees of D.Sc.(Eng.) *honoris causa* from the University of Pretoria, and D.Com *honoris causa* from the University of the Orange Free State. In 1982 Mr Stegmann was appointed Honorary Professor in the Department of Business Economics at the University of Pretoria.



DR L B KNOLL

Non-Executive Chairman, Hendlers Ltd

Dr Knoll obtained his D.Phil. degree from Oxford University for his work on the behaviour of steel at ultra-high rates of strain. In 1948 he started with SAFIM and rose to the position of General Manager. He was Managing Director of Massey-Ferguson (South Africa) Ltd from 1961 to 1980. He was Deputy Chairman and Group Managing Director of Fedmech Holdings Ltd and was Executive Chairman of

Hendlers Ltd from 1984 to 1986. He is also Director of various companies.



MR R A PLUMBRIDGE

Chairman, Gold Fields of South Africa Ltd

Mr Plumbridge joined Gold Fields of South Africa in 1957, was appointed an Executive Director in 1969, a Deputy Chairman in 1974 and Chairman in 1980. He is also Chairman of Driefontein Consolidated Ltd, the largest Group gold mine.

University of the Witwatersrand and studied sugar technology at the University of Queensland, Australia. He joined the Huletts Group as Managing Director of the Sugar Division in 1964, and in 1972 was appointed the Group Managing Director of Huletts Corporation Ltd. He served as the Vice-Chairman of the Tongaat-Hulett Group Ltd and the Chairman of Tongaat-Hulett Sugar Limited until his retirement in 1985, but has retained his directorships on both boards. He is on the Council of the University of Natal and is also a director of The Trust Bank of Africa Ltd.



MR E VAN AS

Group Managing Director and Chief Executive, SAPPI Ltd

Mr Van As started his career as a management trainee with Olivetti (Africa) Pty Ltd. He then joined Henkel (SA) as Managing Director. In 1976 he joined SAPPI as Managing Director and soon became Group Managing Director and Chief Executive.



MR J A STEGMANN

Managing Director and Deputy Chairman, Sasol Ltd

Mr Stegmann obtained B.Sc. (Eng.) and M.Com. (B & A) degrees from the



DR C VAN DER POL

Director, Tongaat-Hulett Group Ltd and Tongaat-Hulett Sugar Ltd

Dr Van der Pol received his B.Sc.(Eng.) and Ph.D. degrees from the

Executive



FRONT ROW (l. to r.)

Dr J F Kemp

Deputy President

Dr C F Garbers

President

Prof. R R Arndt

Deputy President

BACK ROW (l. to r.)

Dr G Heymann

Deputy President

Dr E N van Deventer

Deputy President

Dr J B Clark

Deputy President

President's review

Introduction

In my opinion 1986 will go down in the history of the CSIR as a watershed year. Not only did it celebrate its 40th year of scientific and industrial research, but it also announced a change in course which should make it an even more important technology partner of South African industry. The CSIR serves many markets in both the public and private sectors. Great appreciation has been expressed for its manifold contributions in the past towards industry, the infrastructure, and university research.

However, it became clear that due to the rapidly changing environment in which the CSIR operates, change was necessary for the CSIR to remain successful nationally and internationally.

The CSIR operates in an environment which is largely technology-based. This environment is characterized throughout the world by interdependence, increasing complexity and enhanced dynamism resulting from the information and communications explosions. As a national research and development organization, our mission is to promote national prosperity and improve the quality of life of all South Africans through the power of a broadly based capacity in science and technology. Therefore, not taking into account its past or present successes, the CSIR embarked on a programme of self-analysis which extended to the deepest reaches of its organization and activities. The object was to place ourselves in a better position to serve the scientific and technological needs of this country, especially in view of the socio-political complications which have eroded confidence, and the reality of sanctions.

The year under review

Many notable successes were announced during the year, which ranged from the development of low-cost fire retardants for mining timber to an important breakthrough in the field of energy storage, and from the development of a new steel for the manufacture of rock drills to building methods for low-cost housing on severely expansive clay soils. In general, the CSIR continued its wide-ranging collaboration with 32 state departments, commissions and councils, as well as with universities, museums and technikons. Approximately 2 500 R&D contracts were undertaken for industry. Extensive contributions were made to international programmes; over the past three years there has been scientific collaboration with 14 African countries.

However, the 1985 Government White Paper on Industrial Development Strategy highlighted the need to achieve economic growth to meet the demands of a rapidly growing population. To meet this challenge, the

CSIR finalized its strategy for the future during the year under review.

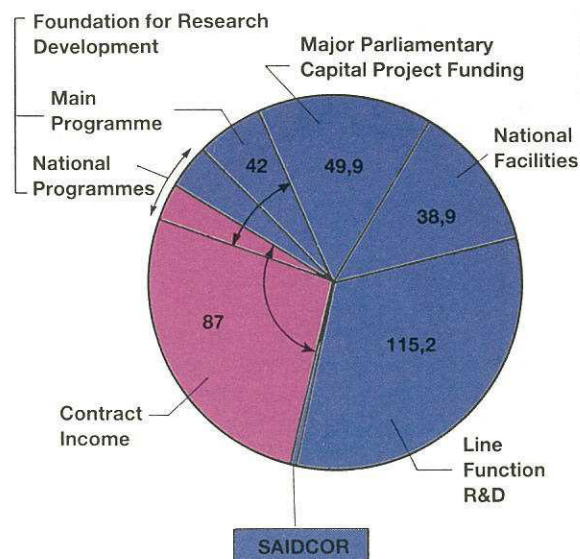
The CSIR of today

Traditionally, the CSIR has the duties of:

- undertaking directed fundamental research to develop innovative technologies of high potential value to the public and private sectors;
- providing national scientific and technical information services;
- providing sponsorship for research and the advanced training of scientists and engineers so as to contribute towards a more sophisticated scientific and technical core in the country;
- operating multi-user national scientific and technological research facilities.

The operational line-function activities are carried out by 22 institutes, laboratories and groups, supported by service departments. The total professional and support staff is 4 700. The parliamentary grant for line function R&D was R115,2 million in 1986 (see diagram). Thousands of contracts were completed for clients in 1986 and earned the organization an additional R87 million.

Use and Sources of Funds (1986/87)



Origins of CSIR funding (as at 1 Sept. 1986)

Source	Amount
Parliamentary Grant	184 059 000
Capital Project Funding	49 879 000
Contract Income	87 156 905
Total	321 094 905

President's review

The funding controlled by the Foundation for Research Development, predominantly for research within universities, museums and technikons, amounted to R42 million, whereas the cost of operating multi-user national facilities was R38,9 million. In addition, major capital projects required R49,9 million.

The change in course

The CSIR, acting within its mandate, intends to adopt an aggressive market-orientated policy in order to become a force in boosting industrial growth.

The change in course will take place on several different fronts:

- The CSIR will strive to mobilize and manage its resources to the full.
- It will strengthen its corporate behaviour and character.
- It will accept commitments not only to research and development (R&D) work, but also to the successful implementation of the R&D findings.
- It will set out to market itself as a professional service for research and development and the application of research.
- It will provide a high level of scientific and technical leadership, and excellence will be rewarded in all staff categories.

The new policies have been adopted in view of many national and international developments:

- The 1985 White Paper on an Industrial Development Strategy for South Africa highlighted the need to promote the industrial development necessary for achieving economic growth so as to meet the demands of a rapidly growing population.
- Cut-backs in government funding and the need to earn a greater share of its budget through contract research to counteract inflation mean that the CSIR will have to expand its technology-related activities.
- The international technology marketplace is growing more and more competitive, so that in order to survive and flourish, local industry will require a higher level of support than ever before.

The mission statement of the CSIR

These objectives of the CSIR are encapsulated in its CORE MISSION STATEMENT: 'The CSIR undertakes, fosters and manages broadly based scientific research, development and technology transfer in support of and to meet the needs of South African industry, community interests and quality of life in a cost-effective and ethical manner.'

Strategy for the future

- In its research, development and implementation function the CSIR will start by determining the requirements of the marketplace and will then endeavour to satisfy the needs of industry within acceptable periods of time. It will initially undertake R&D and assist with technology transfer to meet immediate market needs, but will also prepare itself to be in the position to serve those needs that are likely to arise in the longer term.
- In order to succeed in its objectives, the CSIR recognises that it will have to compete aggressively in the marketplace. It will therefore need skills in entrepreneurship, innovation, management and leadership, as well as scientific and engineering expertise. Its staff recruitment policy will become more flexible and autonomous; it will reward success (and penalise lack of achievement), promote on merit on an equal opportunity basis, encourage in-service training and the acquisition of new skills, and allow talent to be recruited as it is required, both from within and outside the organization.
- Future budgets will be used to promote goal-directed activities and boost productivity. This will mean that corporate objectives will be met by setting goals for both income and expenditure. The amount currently spent on overheads will have to be reduced, expenditure on less important functions will be sharply decreased, and more initiative will have to be shown in generating additional income from outside the organization.
- As far as policy-making is concerned, better provision will be made for new initiatives and formulations from lower levels of management than in the past, by means such as ad hoc task groups and think-tanks of senior managers and technical specialists at many levels who have the talent for long-term strategic planning. Specialist management training programmes will be provided, and corporate responsibility for human resource development, finance, long-term strategic planning and marketing will be introduced at Executive level.
- The research programme will reflect the change of course. In future, achievement in terms of results and costs will be monitored against corporate and institute objectives.

Basic research will still have a place at the CSIR. The CSIR will identify longer term market needs for which basic knowledge is required but does not exist. The basic research required by directed research programmes is vital to the CSIR's strength in the longer term.

President's review

The new focus on technology

As part of its service to industry, the CSIR intends to be both a generator of new technology through its own R&D programmes and an agent for transferring established technology. In technology transfer, priority will be given to those companies with the necessary motivation, need and maturity to benefit from it.

South Africans simply have to exploit science and technology more effectively to generate greater wealth. For nearly 60 years this country has developed its secondary industry. Although the manufacturing industry contributes about 23 per cent of the national gross domestic product, its share is not increasing. Furthermore, the manufacturing industry is less productive and contributes proportionately less to the balance of payments and to job creation than the primary sectors.

Several initiatives have been taken by the CSIR to assist in the improvement of the overall economic contribution of the manufacturing industry.

- The CSIR has committed itself to promoting technology transfer and becoming an important source of technology for South African industry.
- To promote technology innovation, increased funding will be channelled to the institutes for specific projects with industry.
- A Technology Innovation Fund will be set up.
- A separate fund will be established within the Department of Trade and Industry to support technology transfer to industry.

Technology auditing and scanning

The new policy on technology will include making CSIR staff and facilities available to industry on a much larger scale than before. Technology auditing will be used to help industrial firms identify and forecast their technology needs. It is also expected that local firms will be stimulated by knowledge of new foreign technology acquired by means of technology scanning through the CSIR's extensive overseas contacts and the Scientific Liaison Offices in Washington, London, Paris and Bonn.

Technology company

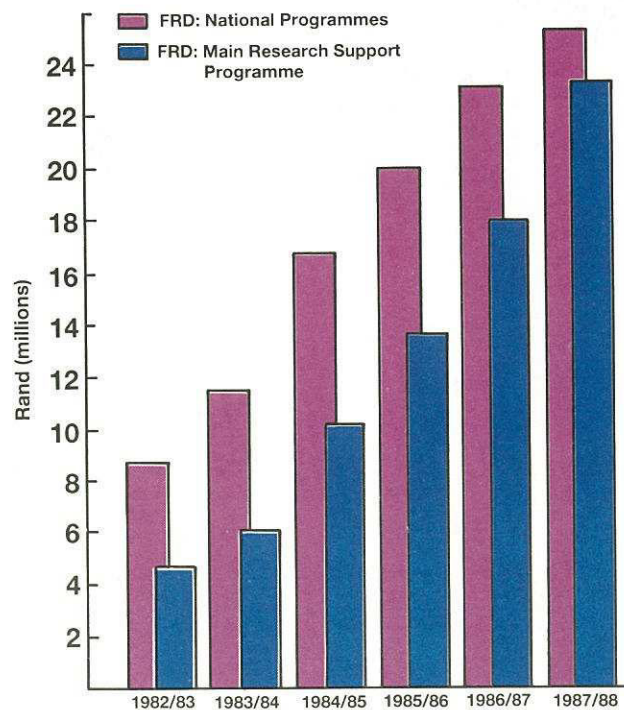
Consideration is also being given to the formation of a technology company, whose activities could include the identification and marketing of technologies appropriate for the country, bringing users and producers of technology together, advising on patenting and licensing, and providing business skills as well as high-risk venture capital for the development and exploitation of technology.

The funding of research at universities, technikons and museums.

The responsibility for funding research on merit at universities, technikons and museums in the natural, applied and engineering sciences, through the Main Research Support Programme is a statutory mandate of the CSIR which is exercised through its Foundation for Research Development (FRD). Additional research is supported by the FRD through 11 National Programmes where the best available multi-disciplinary expertise through multi-institutional participation is mobilized to address research problems of major national significance. Funding currently available for the National Programmes amounts to R25,3 million.

Both the scope and scale of the Main and National Programmes have grown substantially since the FRD was formed through the amalgamation of the Co-operative Scientific Programmes Division and the Research Grants Division in 1984 under Dr R R Arndt. This is especially gratifying in a time of financial constraints.

Foundation for Research Development
Growth of funds



President's review

The number of researchers qualifying for support within the Main Programme in 1986 was 708, substantially more than the 449 scientists supported by the CSIR before the Main Programme was introduced. This is a particularly good sign, since the requirements for qualifying for research support have been tightened considerably in recent years. There has also been a striking increase in the number of bursaries awarded for postgraduate study: from 461 in 1979 to 1 212 in 1986. The annual growth in funding of the Main Programme has varied from 30 to 68 per cent since 1982, and currently (for 1987) stands at R23 350 000. However, the Main Programme has only been partially phased in. It is hoped that the value of this support in 1991, when it is fully phased in, will be more than R52 million (in 1985 rand). In-depth studies have revealed an urgent need for upgrading and replacing obsolete research equipment at universities, technikons and museums.

It is very clear that the CSIR's role in the fostering of academic research has contributed substantially to the advanced training of scientists and engineers in research and to scientific collaboration at a high level in

many fields. However, the CSIR now declares itself willing to transfer to another body the responsibility for funding self-initiated postgraduate research at universities. This will be conveyed to the Advisory Council for Universities and Technikons and the Committee of University Principals. The CSIR's Council has also indicated its preparedness, should it be so requested by the universities, technikons and museums, to continue with the Main Research Support Programme in close collaboration with these bodies.

Managing the national facilities

The CSIR has the responsibility of managing a number of large research facilities that originated outside but were later incorporated into the organization. They include the Magnetic Observatory, the South African Astronomical Observatory, the Radio Astronomy Observatory, the Satellite Remote Sensing Centre and the National Accelerator Centre. Computer services are provided, computer networks are being continually developed, and scientific reference libraries and information services are maintained.

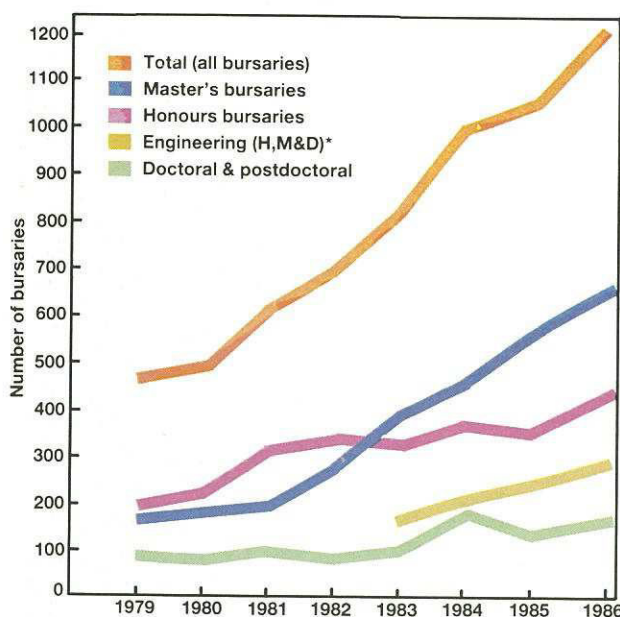
The national facilities cost R38,9 million a year to run. A further R49,9 million was required in 1986 for the construction of new facilities such as the Medium Speed Wind Tunnel, which will be operational in 1988, and the National Accelerator Centre, whose separated-sector cyclotron attained its maximum design energy in October 1986. The Satellite Remote Sensing Centre at Hartebeesthoek will be upgraded to meet new demands. In addition, extra provision will have to be considered to support the South African Astronomical Observatory following the suspension, earlier in 1986, of the bilateral contract with the Science and Engineering Research Council of the UK.

In view of the new financing mechanisms to be introduced for the CSIR, each facility must in future have its own budget and negotiate its own funding with the Directorate of Science Planning on behalf of the user community.

Acknowledgements

On behalf of the CSIR, I would like to express my sincere thanks to Dr D J de Villiers, the former Minister of Trade and Industry, under whose portfolio the CSIR resorted. Owing to a cabinet reshuffle, an association of six years' standing between Dr de Villiers and the CSIR came to an end on 1 December 1986. Professor H P van der Schijff and Mr E Pavitt retired as Council members, and the CSIR would like to express its greatest appreciation for their contributions.

Foundation for Research Development
Postgraduate bursaries allocated in all disciplines
1979-1986



* Engineering bursaries shown for 1983-1986 only

President's review

Three Chief Directors also retired. Dr T J Hugo (National Institute for Aeronautics and Systems Technology), Dr S H Kühn (National Institute for Transport and Road Research) and Dr L Novellie (National Food Research Institute) all left lasting impressions on their fields of research.

Conclusions

During the 1985/86 financial year, the past, the present and the future of the CSIR came sharply under the spotlight. Key people from outside and inside the CSIR contributed extensively towards our strategy for the future. To all these people, my hearty thanks for their support. I would like to mention especially the leadership provided by the collective experience and judgement of the CSIR Council, the co-operation of

leaders in the public and private sectors and the expertise of various consultants which went into the complex task of designing a new strategy for the CSIR. Above all, I would like to thank the senior management of the CSIR, particularly the members of the Executive, for the way in which they accepted the challenge, for their personal sacrifices and for the many extra hours that went into the task.

The CSIR was encouraged by the good reception of the announcement of its change of course, by the enthusiasm shown, and by the development of new opportunities already evident. The change of course has brought about far-reaching changes for everyone at the CSIR. It is understood that we have an increasingly important part to play in the future of South Africa, and however much has already been achieved, the new course will require more hard work and dedication.

C. F. Garbers

PRESIDENT

May 1987

GOLD ALLOYS

New gold alloys have recently been announced for specific sectors of the jewellery industry. The National Institute for Materials Research has been cooperating with industry to develop cost-effective production technologies for the alloying of gold with reactive elements to produce stock material with low inclusion contents, and good surface finish.



Funds

The allocation of money for research and other scientific and technological activities is indicated in the Review. It is an investment which is necessary for the sustained economic growth of any country. A brief analysis of the actual income and expenditure during 1985/86 is presented here to supplement the discussion in the Review.

Total expenditure and income

Although the CSIR's total expenditure (fixed assets and running costs) increased by 21,1 per cent in 1985/86, the real increase (after adjustment for inflation) was only 4,6 per cent. This increase was mainly the result of increased expenditures on laboratory equipment, *research grants, and supplies and services*.

Investigations and services became even more important as a source of income (27,0 per cent of the total income, with a real increase of 0,9 per cent) (diagram 1). The total *parliamentary grant* (67,9 per cent of all income) showed a real decrease of 2,5 per cent since 1984/85, mainly as a result of the staff cuts and the transfer of the National Institute for Personnel Research (NIPR) in 1983/84 to the Human Sciences Research Council (HSRC) as mentioned below. As in the past, these funds were used for the acquisition of knowledge and know-how and for the development and provision of the necessary technical infrastructure and services, including national facilities. This work provides the basis for continued technological innovation (*especially in the South African manufacturing industry*), the maintenance and improvement of the quality of life and the environment, the utilization of available resources and the general advancement of research and the natural sciences in South Africa.

Current expenditure

The total *staff remuneration* (salaries, wages and allowances), which is still the largest component (60,7 per cent) of current expenditure, showed a real decrease of 11,5 per cent since 1984/85. This is mainly the result of the transfer of the NIPR to the HSRC in the previous financial year, staff cuts (through the scrapping of a considerable number of vacant posts, but without any staff lay-offs) and delays in the filling of vacancies owing to restrictions of the Personnel Administration System (PAS).

The further increase in expenditure on *research grants and subsidies* (from 8,9 to 10,7 per cent of all current expenditure) indicates a sustained increase in the

TOTAL INCOME (1975 prices)

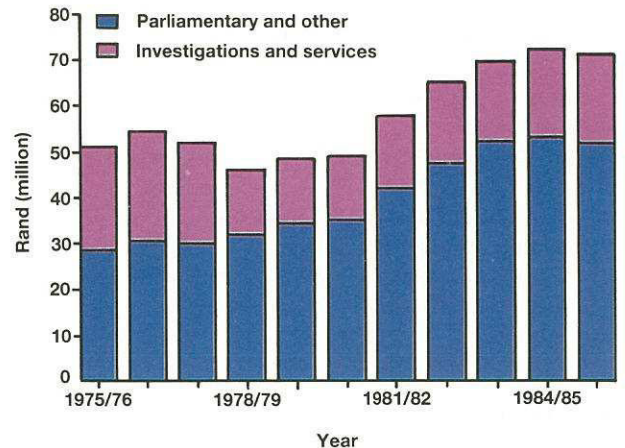


Diagram 1

S&T activities (1985/86, total R226,1 million)

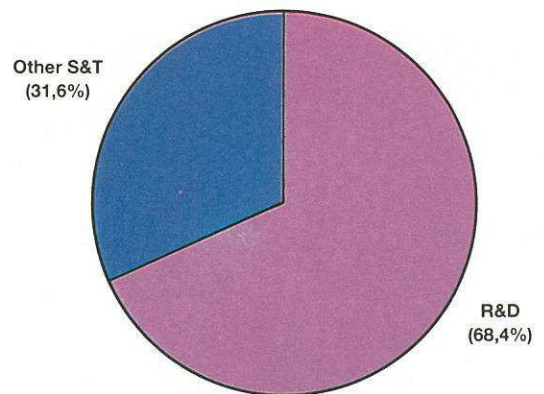


Diagram 2

support of basic and non-directed research projects at universities, museums and technikons, and in grants for research at universities and other research institutions which is aimed at specific national goals. Specific research by and for industry is still being supported.

The real increase of 15,7 per cent in expenditure on *supplies and services* can be ascribed mainly to the expansion of special facilities and to price increases resulting from unfavourable exchange rates.

Funds

**Expenditure on other S&T activities
(1985/86, total R71,4 million)**

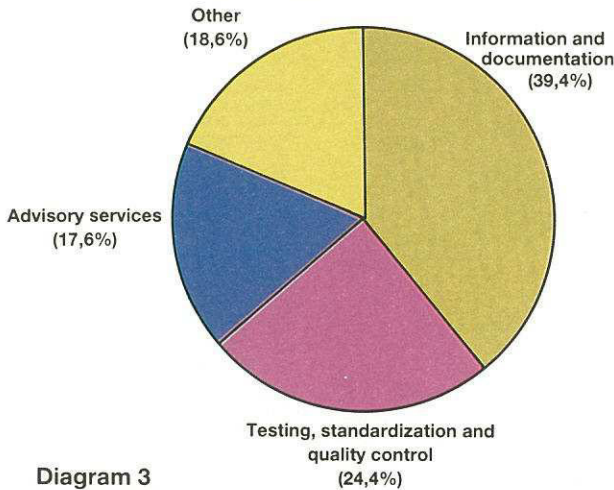


Diagram 3

**R&D expenditure by research field
(1985/86, total R154,7 million)**

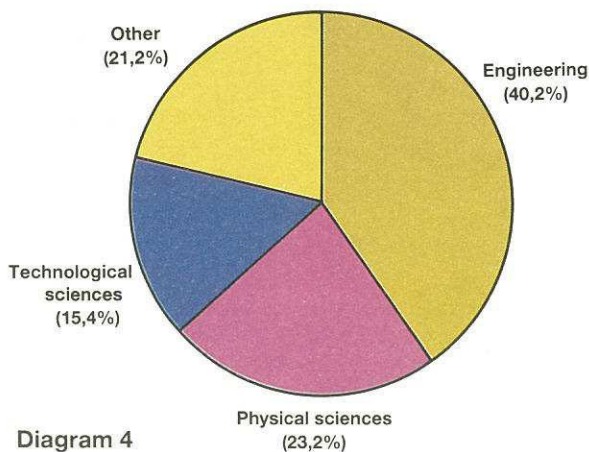


Diagram 4

Capital expenditure

The considerable increase of 102,8 per cent in real expenditure on *laboratory equipment* (which therefore increased to 82,0 per cent of fixed-asset purchases) was the result of investment in equipment especially for national facilities such as the Medium Speed Wind Tunnel and the National Accelerator Centre, unavoidable cost increases owing to unfavourable exchange rates and delayed delivery of capital goods (to the value of R15,5 million) which had already been ordered in 1984/85. This increase was largely financed (60,6 per cent) from funds carried over from previous years.

**R&D expenditure by socio-economic sector
(1985/86, total R154,7 million)**

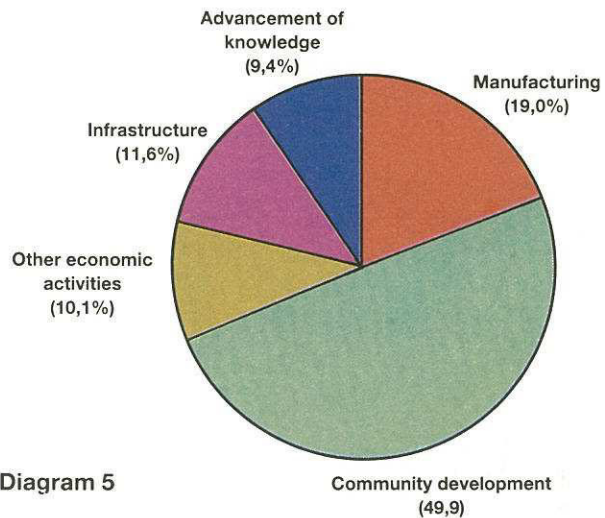


Diagram 5

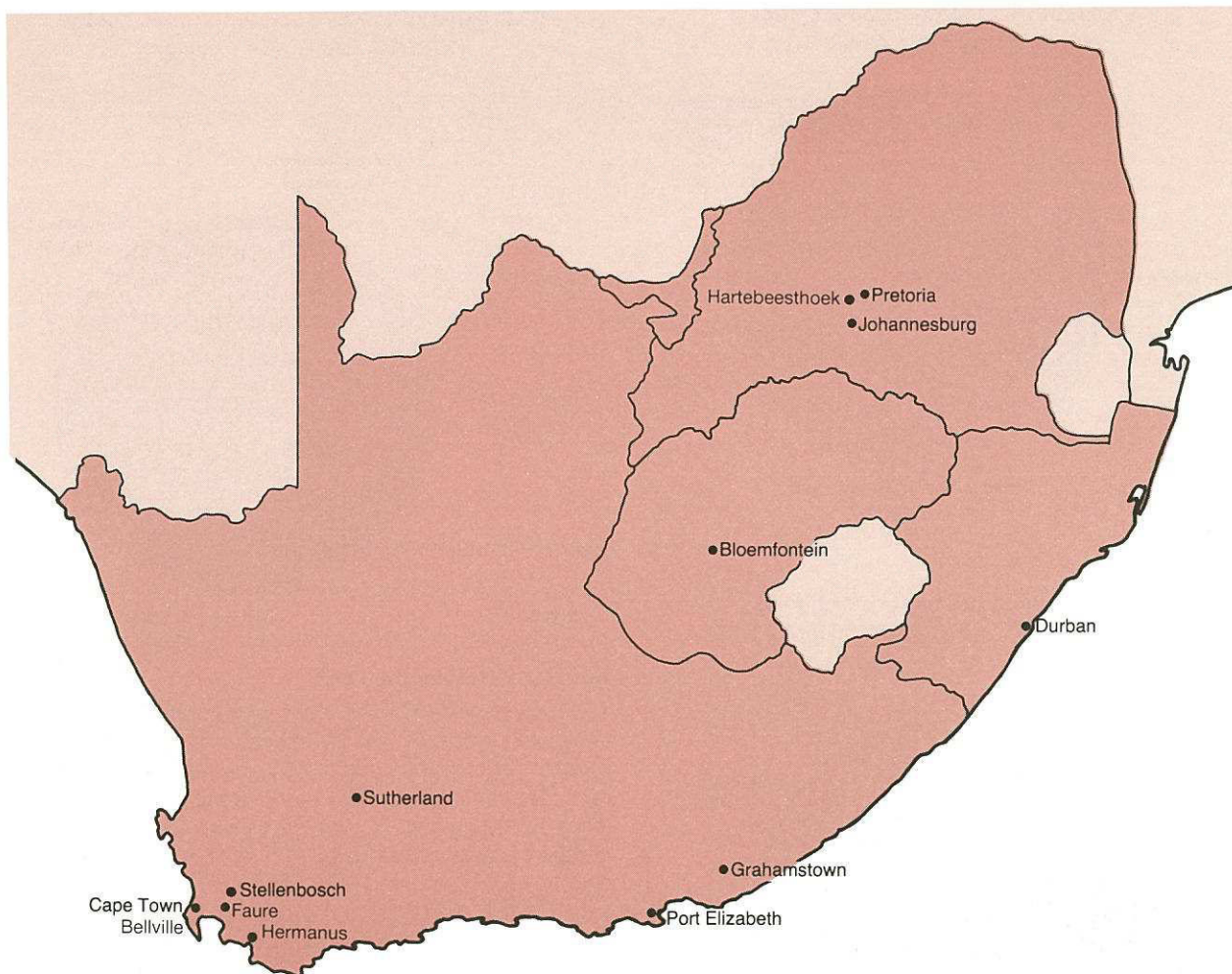
Activity pattern of the CSIR

The largest part (68,4 per cent) of the total expenditure (after deduction of grants and subsidies) is used for *research and development (R&D)*, and the rest (31,6 per cent) for *other scientific and technological activities* (other S&T) (diagram 2). The latter involves the extension of the necessary infrastructure for the country's research and development, and the provision of scientific and technological services to industry and other economic sectors. The most important components here were *information and documentation* (39,4 per cent of other S&T), *specialized test work, standardization and quality control* (24,4 per cent) and *advisory services* (17,6 per cent) (diagram 3).

Concerning the distribution of the R&D funds amongst the most important fields of research (or disciplines), the largest components were again the *engineering sciences* (40,2 per cent of R&D), the *physical sciences* (23,2 per cent) and *technological sciences* (15,4 per cent) (diagram 4).

The CSIR devotes special attention to those branches of science that are essential for the technological development of the country's industry and infrastructure. This is apparent from the total R&D expenditure directed at specific socio-economic sectors. The largest contributions were for the *manufacturing sector* (19,0 per cent) and *community development* (49,9 per cent). *Other economic activities* (10,1 per cent), *development of the infrastructure* (11,6 per cent) and *general advancement of knowledge* (9,4 per cent) were also supported (diagram 5).

Organization and functions of the CSIR



Pretoria

- ACU — Applied Chemistry Unit
- CERG — Chemical Engineering Research Group
- FRD — CSIR Foundation for Research Development
- IRS — Information and Research Services
- NBRI — National Building Research Institute
- NCRL — National Chemical Research Laboratory
- NEERI — National Electrical Engineering Research Institute
- NFRI — National Food Research Institute
- NIAS — National Institute for Aeronautics and Systems Technology
- NICR — National Institute for Coal Research
- NII — National Institute for Informatics
- NIMR — National Institute for Materials Research
- NITRR — National Institute for Transport and Road Research
- NIWR — National Institute for Water Research
- NMERI — National Mechanical Engineering Research Institute
- NPRL — National Physical Research Laboratory
- NRIMS — National Research Institute for Mathematical Sciences
- NTRI — National Timber Research Institute
- TSD — Technical Services Department

SAIDCOR — South African Inventions Development Corporation

Johannesburg

- NITR — National Institute for Telecommunications Research

Hartebeesthoek

- SRSC — Satellite Remote Sensing Centre
- RAO — Radio Astronomy Observatory

Sutherland

- SAAO — South African Astronomical Observatory

Cape Town

- SAAO — South African Astronomical Observatory

Faure

- NAC — National Accelerator Centre

Stellenbosch

- NRIO — National Research Institute for Oceanology

Hermanus

- MO — Magnetic Observatory

Port Elizabeth

- SAWTRI — South African Wool and Textile Research Institute

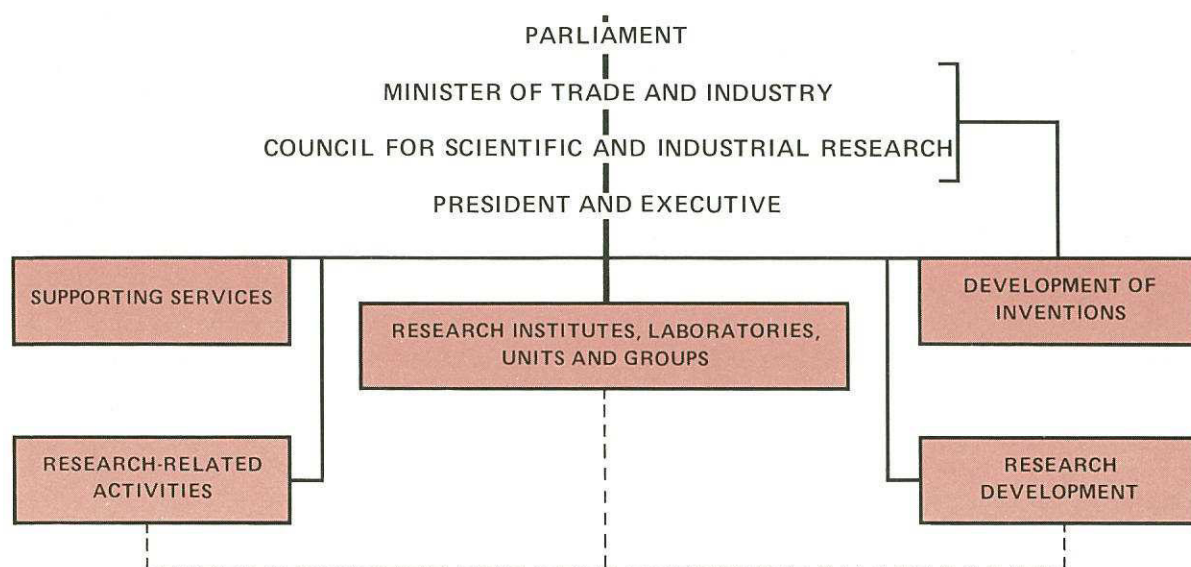
Regional Representation

- Johannesburg
- Bloemfontein
- Cape Town
- Bellville
- Port Elizabeth
- Durban

Industrial Research Institutes

- FIRI — Fishing Industry Research Institute (Cape Town)
- LIRI — Leather Industries Research Institute (Grahamstown)
- SMRI — Sugar Milling Research Institute (Durban)

Organization and functions of the CSIR



NATIONAL CHEMICAL RESEARCH LABORATORY

Chief Director: Dr J R Bull



The National Chemical Research Laboratory (NCRL) is a centre at which the latest developments in chemical science are brought to bear on problems of national significance.

In accordance with its policy, namely of concentrating on research in fields where there is a need for more basic knowledge, many of the Laboratory's research projects are carried out in collaboration with research organizations that are more directly concerned with the application and exploitation of research findings. Well-motivated long-term projects are therefore approached from a fundamental point of view. The Laboratory is also responsible for providing advanced research services to chemists in South African universities and industrial laboratories.

The NCRL is organized into divisions for analytical chemistry, inorganic chemistry, molecular biochemistry, structural chemistry and organic chemistry.

NATIONAL PHYSICAL RESEARCH LABORATORY

Chief Director: Dr J S V van Zijl



The activities of the National Physical Research Laboratory (NPRL) are determined by the industrial and national needs of the Republic of South Africa. Research and development is undertaken in the various fields of the natural sciences, including optics, solid state physics, geophysics, acoustics, geochronology, atmospheric physics and natural isotopes. The research is usually carried out in fields of application where a need for further knowledge exists or is anticipated, but it can also be of a more fundamental nature.

The NPRL is organized into two main research groups dealing with General Physics and Earth and Atmospheric Sciences, each of which consists of a number of key divisions staffed by specialist researchers. Proficiency is required in highly advanced techniques, and personnel of the NPRL have to be especially conversant with those involving physical measurements and methods in order to make a meaningful contribution.

In addition, in terms of Act 76 of 1973, the NPRL has statutory responsibility for the maintenance of the national measuring standards of mass, length, time, temperature, electricity, light, ionizing radiation, force and pressure.

Organization and functions of the CSIR

NATIONAL ACCELERATOR CENTRE

Chief Director: Dr D Reitmann



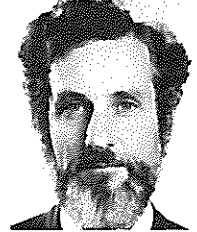
In 1977 the CSIR accepted the responsibility of establishing the National Accelerator Centre (NAC) with the commission to provide multidisciplinary accelerator facilities for the use of all scientists in the country who are interested in research with and the application of beams of accelerated particles. The NAC consists of two groups, one near Faure whose main responsibilities at present are the construction of a separated-sector cyclotron facility with a maximum energy of 200 MeV per nucleon and the operation of a 6 MeV Van de Graaff accelerator, and another in Pretoria, using the CSIR cyclotron there.

The objectives of the NAC in broad terms are:

- to provide facilities for basic and applied research using beams of accelerated particles;
- to provide service facilities in South Africa for particle therapy and clinical trials in various treatment methods;
- to supply accelerator-produced radioactive isotopes to users in nuclear medicine, research and industry.

SOUTH AFRICAN ASTRONOMICAL OBSERVATORY

Chief Director: Prof. M W Feast

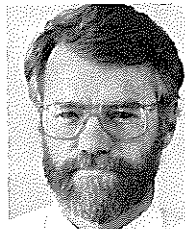


The Headquarters of the South African Astronomical Observatory (SAAO) are situated in the grounds of the former Royal Observatory in Cape Town. A major observing facility equipped with modern instrumentation has been established at Sutherland in the Karoo. The large number of clear nights each year and the absence of smog and city lights makes this an excellent site for astronomical observations.

Besides being the National Observatory of South Africa, the SAAO provides observing facilities for visiting astronomers and the South African universities. Staff and visitors carry out research on a wide variety of astrophysical problems such as the chemical composition of stars, the nature of stellar pulsations, the size and structure of our Galaxy, the extra-galactic distance scale, active galaxies and quasars. Investigations are also carried out in collaboration with space and radio astronomers.

NATIONAL RESEARCH INSTITUTE FOR MATHEMATICAL SCIENCES

Chief Director: Dr D H Martin

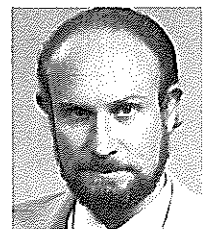


The National Research Institute for Mathematical Sciences (NRIMS) consists of divisions for numerical and applied mathematics, mathematics and systems science, computer science, operations research and statistics, and theoretical physics.

Research activities cover the various mathematical sciences and their applications. Typical fields of study are theoretical nuclear physics, differential equations, control theory and optimization, statistical analysis techniques, methods of operations research, decision support systems, numerical analysis, interactive computer graphics and special programming languages.

MAGNETIC OBSERVATORY

Head: Dr G J Kühn



The Magnetic Observatory at Hermanus is an important link in a world-wide network of organizations engaged in studies of the behaviour of the magnetic field of the earth. For this purpose the Observatory operates a chain of four magnetic recording stations extending from Tsumeb in the north to Sanae (Antarctica) in the south. As there is a direct interaction between variations of the magnetic field and the motion of charged atomic particles in the magnetosphere, particle-related geophysical phenomena (such as the aurora) are also recorded and studied as part of the research programme of the Observatory.

Organization and functions of the CSIR

In addition to its continuous monitoring programmes, the Observatory conducts regular country-wide surveys for the purpose of compiling magnetic charts for Southern Africa. Attention is also given to the use of satellite magnetic data for magnetic field modelling and for the mapping of crustal magnetic anomalies in Southern Africa.

The research programme of the Observatory embraces the study of disturbed conditions in the magnetosphere, including magnetic pulsations and magnetic substorm phenomena, as well as the study of the nature of regular quiet-time variations of the magnetic field. Variations of the magnetic field are also used by means of the so-called magneto-telluric method to study the electrical properties of material in the crust of the earth.

NATIONAL MECHANICAL ENGINEERING RESEARCH INSTITUTE

Chief Director: Dr M S Hunt



The National Mechanical Engineering Research Institute (NMERI) deals mainly with the development of mechanical engineering processes and techniques, and the improvement of machinery, plant designs and materials used in industry. The Institute is also active in civil engineering hydraulics and geomechanics, which play an important role in mining and civil engineering.

The laboratories of the Institute at Scientia, Pretoria, accommodate divisions for design and development, tribology, strength mechanics, geomechanics, fluid mechanics, aeromechanics and heat mechanics (including air-conditioning and refrigeration). The Mine Equipment Research Unit in Cottesloe, Johannesburg, which deals mainly with the safety of mine hoist ropes, is also part of the Institute.

The Institute's Production Engineering Advisory Service (PEAS) is active in the fields of production engineering, machining technology and machine development.

NATIONAL RESEARCH INSTITUTE FOR OCEANOLOGY

Chief Director: F P Anderson



The National Research Institute for Oceanology (NRIO), which has its headquarters at Stellenbosch, is a multidisciplinary organization in which all marine and coastal engineering sciences are represented. The research divisions are supported by a full range of services required to run a large institute remote from CSIR headquarters in Pretoria.

The coastal zone of South Africa is under severe pressure due to growing population and its increasing affluence, and the Institute puts much effort into studying all aspects of this area in order to understand its natural functioning and predict man's impact on it. The dynamics of the Southern Ocean are also studied to determine the role of this ocean in Southern African weather and climate.

NATIONAL ELECTRICAL ENGINEERING RESEARCH INSTITUTE

Chief Director: Dr J D N van Wyk



The National Electrical Engineering Research Institute (NEERI) undertakes research and development in widely differing fields of electrical engineering with a research programme which covers the broad technology fields of cybernetics, microelectronics and power systems.

The dynamic nature of NEERI's research programme is reflected in its flexible management structure, which allows the most advantageous grouping of individual activities to accommodate immediate needs and to allow for shifts in emphasis.

Organization and functions of the CSIR

The research activities are grouped into three broad technology fields, namely cybernetics (which encompasses digital systems technology and industrial technology), microelectronics, and power systems. Each programme is directed by a Programme Leader, assisted by a Programme Manager and various Divisional Heads, and these three programmes are co-ordinated ultimately by the Chief Director.

In addition to the research activities, a number of special facilities and services are also maintained and provided by the Institute. These include, amongst others, maintenance and calibration services for specialized electronic equipment, as well as facilities for the design and manufacture of integrated circuits and the computer-aided design of printed circuit boards. Finally, the Institute undertakes the practical training of diploma technicians in electronic engineering for the CSIR and maintains a national information service on electronic instrumentation.

interdisciplinary nature of chemical engineering, collaboration with other institutes and organizations is important.

Research and development items are selected according to the immediate and anticipated needs of industry. The main subjects are heat and mass transfer, properties of fluids, energy utilization in the process industry (particularly in drying), fluid dynamics, particle technology, reactor technology and catalysis, and prevention of air pollution. A wide range of consulting services are provided which can, if necessary, be supported by applied or fundamental research.

CHEMICAL ENGINEERING RESEARCH GROUP



Head, CERG
(until 30 Oct 1986):
W G B Mandersloot



**Acting Chief Director,
NICER**
(from 1 Nov 1986):
Dr R E Hicks

The activities of the Chemical Engineering Research Group (CERG)* cover not only the needs of the chemical industry, but also many processing aspects of the petroleum, petrochemical, mineral, food, beverage, biochemical, pharmaceutical, ceramic, paper and textile industries and environmental technology (in which water, effluent and air are important). Owing to the

NATIONAL BUILDING RESEARCH INSTITUTE



Chief Director: Dr J Morris

The National Building Research Institute (NBRI), with a staff complement of some 240 people, has its headquarters in Pretoria and regional offices in other main centres. Its annual budget of some ten million rand is approximately one-tenth of one per cent of the amount spent on building and construction in South Africa every year. About one-third of its total budget is earned by services rendered to the building community.

The Institute's divisions cover a wide range of research fields but areas selected for special emphasis in the first half of this decade are -

- housing, particularly in the low income sector;
- school buildings, with special reference to the backlog in and special needs of Black education;
- promotion of human health, productivity and safety via design and planning of buildings and building services;
- conservation and development of material and energy resources.

The effective application of research results in the building industry is one of the Institute's high priority objectives.

* Granted national institute status on 1 November 1986 and renamed National Institute for Chemical Engineering Research (NICER).

Organization and functions of the CSIR

NATIONAL INSTITUTE FOR WATER RESEARCH

Chief Director: Dr D F Toerien



Water research is essential to a country such as South Africa where water is the most vital limiting factor in socio-economic growth. The task of the National Institute for Water Research (NIWR) is to promote optimum use of available water resources. Its activities include investigations into water purification, the treatment of effluent to meet the requirements of specific norms and the various types of pollution encountered in dams, rivers and estuaries.

The Institute is divided into a number of research divisions and has branch laboratories in Durban and Bellville. Basic and applied research on a wide range of problems concerning the country's water supplies is done on a multidisciplinary basis. Research divisions have been established for limnology, water quality, biotechnology, process technology, appropriate technology, solid wastes, groundwater quality, estuaries and coastal regions. Another division renders advisory services on water care.

NATIONAL INSTITUTE FOR TRANSPORT AND ROAD RESEARCH

Chief Director: Dr S H Kühn



Transport and road authorities encounter a wide range of problems in their endeavours to ensure the most economical use of transport facilities as a public amenity. The research programme of the National Institute for Transport and Road Research (NITRR) is directed at finding solutions to these problems through research into the planning, design, construction, maintenance and operation of roads and transport systems,

road safety and the behaviour of road users, and the role of roads and transport in society. Another important function of the NITRR is to ensure the effective dissemination and application of research findings throughout the transport industry.

The NITRR works in close collaboration with national and provincial transport and road authorities, the South West Africa Administration, the South African Transport Services, the National Road Safety Council and the road and transport industries, which together provide most of the funds for research.

NATIONAL INSTITUTE FOR TELECOMMUNICATIONS RESEARCH

Chief Director: R W Vice



The National Institute for Telecommunications Research (NITR) carries out research and development in radio science and its applications. The work of the Institute falls under five research divisions.

The Radiocommunications Division is concerned with the prediction of the performance of communications systems under various environmental conditions.

The Systems and Circuits Division develops radio and radar systems for specialized applications, an example being the development of microwave distance measuring equipment.

The Radiometeorology Division carries out research into the use of radar in the measurement of rainfall and the observation of storm dynamics. It also conducts a programme of lightning research using radio techniques.

A programme of radio astronomy is carried out by the Radio Astronomy Division. The facilities include a 26-m radiotelescope and the associated radiometers.

The Satellite Remote Sensing Centre is responsible for the acquisition, processing and distribution of satellite data and imagery of the earth's surface and atmosphere. It is principally involved with data from the Landsat and Meteosat satellites and with the tracking of satellites on behalf of the French Centre National d'Etudes Spatiales.

Organization and functions of the CSIR

NATIONAL INSTITUTE FOR AERONAUTICS AND SYSTEMS TECHNOLOGY

Chief Director: Dr T J Hugo



The National Institute for Aeronautics and Systems Technology (NIAST) consists of laboratories for electronics, systems, aeronautics and electrical support. Its task is to develop technological expertise in these fields for the benefit of the relevant industries.

The Institute's main activities are concentrated on flight dynamics, aerodynamics, aircraft structures, propulsion, servo-mechanisms, and digital and microwave systems. Multidisciplinary projects, some involving extensive systems analyses, are also undertaken.

NATIONAL FOOD RESEARCH INSTITUTE



Chief Director
(until 30 April 1986):
Dr L Novellie



Chief Director
(from 1 May 1986):
Dr P S Steyn

The main aim of the National Food Research Institute (NFRI) is to promote effective utilization of South Africa's food resources. The Institute consists of five research divisions: Food Chemistry, Food Technology, Biological Evaluation, Fermentation Technology, and Oils and Fats, and it also administers and is closely associated with the CSIR's Microbiology Research Group and Sorghum Beer Unit.

Typical fields in which fundamental and applied research are carried out are processing of subtropical crops, cereal technology and biochemistry, food processing and storage, lipid chemistry and technology, food microbiology, food analysis, fermentation processes and brewing technology. Biological studies of the utilization of nutrients in foods and diets are also undertaken.

SOUTH AFRICAN WOOL AND TEXTILE RESEARCH INSTITUTE

Chief Director: Dr D W F Turpie



The South African Wool and Textile Research Institute (SAWTRI) in Port Elizabeth conducts research on those natural fibres – particularly wool, cotton and mohair – that are of major importance to the South African fibre producers and textile industry. Blends of these natural fibres with synthetic fibres are also studied.

In essence the Institute is a self-contained experimental textile factory with processing facilities enabling it to process almost any staple fibre from the raw state to the garment stage on full-scale machinery.

Textile research is aimed at improving our knowledge and understanding of locally produced textile fibres, their behaviour during processing and their end use for the benefit of the fibre producer, the textile manufacturing industry and the consumer. Greater efficiency in the processing, dyeing and finishing of textiles is an important goal, which sometimes necessitates further development of existing processing machinery as well as the designing of new machines and instruments. Another important aim of the research programme is to impart to the final product the aesthetic and technical qualities, particularly easy-care properties, that are now being demanded by the discerning customer.

Finally, the Institute provides an important service in assisting the textile industry with trouble shooting and problem solving.

NATIONAL TIMBER RESEARCH INSTITUTE

Chief Director: Dr A Pizzi



The aim of research and development work at the National Timber Research Institute (NTRI) is to make available knowledge and expertise which will help the timber processing industry to make maximum use of South Africa's timber resources.

Organization and functions of the CSIR

The research is conducted in close collaboration with the timber processing industry to ensure that the results are applied and products manufactured which are acceptable to the consumer in terms of sophistication, quality and price.

Approximately one third of the Institute's budget of R3,3 million is derived from the timber processing industry.

The Institute has three divisions, the Chemistry, Engineering and Survey Divisions, at the Lynnwood Road complex in Pretoria, extensive pilot plant facilities at Research Road, Pretoria West, and a station for the sampling of export coal at Durban.

The three divisions conduct basic and applied research, both in the national interest and under contract to the coal industry and government departments.

NATIONAL INSTITUTE FOR MATERIALS RESEARCH

Chief Director: Prof. G G Garrett

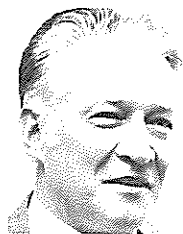


The National Institute for Materials Research (NIMR) carries out directed research and development in the fields of ceramics, electronic materials and metals (and polymers – under development) to support industrial needs, and, wherever possible, to exploit the national materials potential. Special emphasis within this multidisciplinary environment is thus given to developing import replacement technologies, finding new applications for South African raw and engineering materials and promoting their export and wider utilization. A primary objective is to establish joint ventures with industry to implement research results by technology transfer.

The research focuses on the structure-property relationships of materials and how these can be manipulated and optimized by processing, as well as on the performance of materials in engineering systems. Expertise and facilities of the highest international standards are used to promote materials science and engineering in South Africa.

NATIONAL INSTITUTE FOR COAL RESEARCH

Chief Director: Dr T C Erasmus



The National Institute for Coal Research (NICR), formerly the Fuel Research Institute of South Africa, was incorporated into the CSIR in 1983.

APPLIED CHEMISTRY UNIT

Head: Dr V P Joynt



The Applied Chemistry Unit (ACU) is an independent CSIR unit largely financed on a contract basis by outside organizations to undertake studies on the application of chemistry to various production and engineering problems.

These studies are frequently joint programmes in which the sponsors second staff to the Unit to contribute directly to the research and development effort.

TECHNICAL SERVICES DEPARTMENT

Head: Mr P Lasserre



The Technical Services Department (TSD) designs and manufactures research equipment and renders essential services such as graphic arts, transport and stores to the laboratories and institutes of the CSIR.

The Department also undertakes work on contract for other bodies and industry if the work cannot be done anywhere else in South Africa.

Organization and functions of the CSIR

INFORMATION AND RESEARCH SERVICES

Chief Director: Dr L R P Butler



The Information and Research Services (IRS) is the corporate liaison activity within the CSIR with the following objectives:

- to act as the central liaison and communication centre for the CSIR;
- to promote the corporate image of the organization;
- to provide a management information service, both financial and techno-economic, for scientific and technology decision makers and strategic planners within the CSIR and elsewhere;
- to liaise closely with industry to promote research and development, as well as to encourage interaction with research bodies;
- to provide direct and indirect techno-economic support for stimulating development in the local manufacturing sector;
- to communicate the major scientific and technological successes and achievements of the CSIR to the public, private and educational sectors;
- to promote international scientific relations and represent South Africa in the field of science and technology overseas.

Although some rationalization in the organizational structure has taken place and closer collaboration between the information and computing technologies has been implemented, the two services will retain their identities as the Centre for Scientific and Technical Information and the Centre for Computing Services.

The Centre for Scientific and Technical Information (CSTI) has as its general objective the promotion of use of scientific and technical information, in terms of the Scientific Research Council Act, which states that it is one of the functions of the CSIR 'to establish and control facilities for the collection and dissemination of information in connection with scientific and technical matters'.

To achieve this objective, the CSTI's main functions are as follows:

- the provision of information and library services to CSIR staff and to users outside the CSIR;
- the promotion and/or provision of information and library services to scientific and technical organizations and to industry;
- the undertaking of applied research in the library and information field.

The Centre for Computing Services (CCS) provides for the computing requirements of all CSIR institutes and carries out research to develop and support this function.

The computing facilities consist of three large central processors at Scientia and a smaller one at Faure, serving some 25 CSIR institutes, laboratories, units and groups situated in various parts of the country. Research workers have access to these facilities, directly or via some 700 terminals, or via minicomputers or remote job entry stations linked to the central computers through a data communications network.

A wide range of software for interactive working, data base management, file and data management and for various applications is available on these systems.

The Centre also provides the necessary supporting services such as program guides and other information, training courses and a consulting service for its users.

University research projects approved by the CSIR Foundation for Research Development are also granted time on the CSIR computers and in particular circumstances, and subject to certain conditions, facilities are made available to outside bodies.

NATIONAL INSTITUTE FOR INFORMATICS

Chief Director: V A Shaw



The National Institute for Informatics was formed in 1984 by the merging of the Centre for Scientific and Technical Information and the Centre for Computing Services.

This merger indicates recognition by the CSIR of the increasing importance and mutual interdependence of information and computing technologies.

Organization and functions of the CSIR

FOUNDATION FOR RESEARCH DEVELOPMENT

Head: Dr R R Arndt (Deputy President)



The Foundation for Research Development (FRD), which was formed in 1984 to combine the functions of the former Cooperative Scientific Programmes (CSP) and the Research Grants Division (RGD), is responsible for the development of research in the natural and applied sciences in South Africa.

The funds provided by the State to support own-choice research at universities, museums and technikons is administered in terms of the Main Research Support Programme (which continues the work of the RGD). These funds are awarded to postgraduate students and established researchers on the basis of individual merit by the Main Research Support Programme's Advisory Committee and its various specialist subcommittees.

The National Programmes (previously the CSP) are aimed at solving well-defined national problems through co-operative research. Here the objectives of the proposed research and the quality of the research team are the criteria for support. The National Programmes were introduced to co-ordinate research efforts and to mobilize the best available expertise for research into complex interdisciplinary and multi-institutional problems of national and international importance that are unlikely to be solved by separate organizations working in isolation. Earlier programmes, several of which are still in existence, developed out of our participation in global ventures of the International Council of Scientific Unions (ICSU). Later programmes, on the other hand, are mainly focused on national needs.

The co-ordinators collaborate with scientists and managers of statutory organizations, government departments and the private sector in planning, harmonizing and developing these programmes.

Stimulation Support Programmes will be introduced to promote research not catered for by the existing programmes.

At present there are national programmes for the following fields of research: oceanography (with programmes on the Benguela ecology, coastal processes, estuaries, marine pollution, marine linefish and marine sedimentology); Antarctic research (with sections for biological, earth, oceanographic and upper atmosphere sciences); environmental sciences (with sections for inland water ecosystems, terrestrial ecosystems and

nature conservation research); geosciences; renewable feedstocks; wastes management (with sections for urban, chemical, mineral and organic wastes); energy (sections for energy in transportation, coal research, and alternative technology); remote sensing; weather, climate and atmosphere research; microelectronics; aquaculture; and biotechnology.

LABORATORY FOR MOLECULAR AND CELL BIOLOGY

Director: Prof. J A Thomson



The CSIR Laboratory for Molecular and Cell Biology (LMCB), which employs 27 scientists and technical staff, is currently involved in a number of research fields of commercial interest.

Research on *Bacillus* is focused on the cloning and expression of x-amylases and proteases for use in the food and chemical industries. Fermentation trials with the cloned x-amylase are in progress.

The second area of research involves the study of *Agrobacterium tumefaciens* as a biocontrol agent to prevent the economically important disease of crown gall in fruit trees. Studies on the genetics of the mode of biocontrol are under way with a view to genetically constructing a more effective biocontrol agent with a broader spectrum of activity.

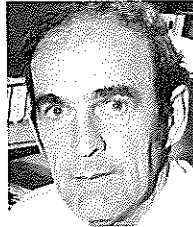
Work in a decentralized laboratory located at Onderstepoort Veterinary Research Institute is concerned with the utilization of cellulosic substrates by ruminants with the aim of optimizing animal feedstocks. One approach is the cloning of the cellulase genes from rumen bacteria in order to boost the cellulase levels.

The aim of the LMCB is to develop biotechnology and molecular biology for the benefit of South African industry.

Organization and functions of the CSIR

LEATHER INDUSTRIES RESEARCH INSTITUTE

Director: Dr D R Cooper



The Leather Industries Research Institute (LIRI) in Grahamstown is regarded as the pioneer of industrial research for South Africa's secondary industry. From its early beginnings in 1935 in the Chemistry Department of Rhodes University, the Institute has maintained a steady growth.

A feature of LIRI's work is the balance maintained between basic research and the application of science to the everyday technical problems of the industries served. A high rate of technology transfer has been achieved thanks to the close personal contact between the many subscribers and the frequency of factory floor contacts at all levels between research and production staff.

SUGAR MILLING RESEARCH INSTITUTE



Director
(until 31 Oct 1986):
Dr A B Ravnö



Director
(from 1 Nov 1986):
Dr J Brijn

The Sugar Milling Research Institute (SMRI) is the central scientific organization involved in research into the manufacturing problems of the South African sugar industry. It was established in 1949 by the South African Sugar Millers' Association Limited (SASMAL), the CSIR and the University of Natal, on whose campus it is situated in Durban. The Institute is financed by SASMAL and the CSIR.

In addition to all South African sugar mills, a number of sugar factories in neighbouring countries are also affiliated members of the Institute.

The main functions of the SMRI are as follows:

- Research into various aspects of the production of sugar from sugarcane, involving both basic chemical problems and the engineering aspects of factory design.
- Control and microbiological analysis of the sugar, molasses and intermediate products of the factory.
- Advisory work on factory and industrial problems.
- Research into the utilization of by-products of the sugar industry.
- Dissemination of information on sugar manufacture and by-product utilization.
- Training courses in sugar technology for chemical engineering diplomates in collaboration with the Natal, M L Sultan and Mangosuthu Technikon.

(The sugar industry maintains a research station at Mount Edgecombe, Natal, where the cultivation of sugarcane is studied.)

FISHING INDUSTRY RESEARCH INSTITUTE

Director: Dr J P H Wessels



The Fishing Industry Research Institute (FIRI), which is affiliated to the University of Cape Town, is situated on the university campus.

The Institute is financed by voluntary contributions from the fishing industry and a subsidy from the CSIR. Firms which are indirectly connected with the fishing industry are eligible for associate membership of the Institute.

The affairs of the Institute are managed by a Board of Control on which the fishing industry, the CSIR, the Minister of Environment Affairs, the Fisheries Development Corporation of South Africa Ltd, and the Universities of Cape Town and Stellenbosch are represented. The research programme is planned and executed in consultation with specially appointed committees, the members of which are prominent technical personnel of the inshore and white fish industries.

The principal role of the Institute is to undertake fundamental and applied research on behalf of the fishing industry. This involves a variety of different products and processes, such as refrigerated and frozen whole rock lobster and rock lobster tails, canned pilchards and mackerel, fish meal, fish oil and the like.

Organization and functions of the CSIR

The Institute also acts as a technical adviser to the industry on the purification of effluent, the control of odour, the testing of packaging materials and the purification of water for use in factories. Co-operation with international organizations such as the International Association of Fish Meal Manufacturers and the International Institute of Refrigeration ensures that the industry keeps pace with the progress taking place in every sphere of fish processing.

ADMINISTRATIVE SERVICES DEPARTMENT

Chief Director: J D van Zyl



The Administrative Services Department (ASD) has the following functions:

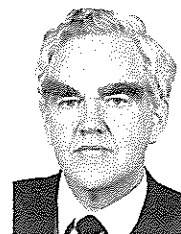
- The perusal and interpretation of all legal, civil service or statutory regulations pertaining to the CSIR, and applying and making them operational.
- Advising the CSIR Executive and Council on financial, legal and administrative policy matters.
- Advising institutes on the interpretation and application of CSIR policy.
- Exercising global financial management and control, the development and maintenance of financial systems, compiling of budgets and the preparation of

financial reports.

- Exercising personnel management and control, and the development, co-ordination and/or maintenance of related functions.
- Exercising management and control of a general administrative nature.

ESTATE SERVICES DEPARTMENT

Chief Director: G W Donaldson



The Estate Services Department (ESD) controls the planning, design and construction of CSIR buildings and the associated services such as air-conditioning, electrical reticulation, water supply, drainage, roads and parking.

The Department is responsible for the maintenance of buildings and services, and also for cleaning and gardening on CSIR sites. It is also responsible for safeguarding CSIR property through its security services, the enforcement of safety and security measures and provides fire fighting equipment and training. ESD also provides catering services at the CSIR Conference Centre and precooked frozen meals for CSIR staff.

Financial statements

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

STATEMENT 1

BALANCE SHEET AT 31 MARCH 1986

	General Fund R	Building Fund R	1986 R	1985 R
<i>Accumulated funds:</i>				
Balance brought forward	174 960 527,62	99 760 137,98	274 720 665,60	223 508 183
<i>Additions:</i>				
Income over expenditure	7 343 629,77	—	7 343 629,77	3 507 924
Transfer of funds	(44 858,00)	44 858,00	— ¹	—
Capital income (Note 1)	38 282 493,56	11 424 714,55	49 707 208,11	39 642 429
Physical assets and funds received	1 080 711,51	—	1 080 711,51	11 960 033
	221 622 504,46	111 229 710,53	332 852 214,99	278 618 569
<i>Reductions:</i>	2 459 888,73	—	2 459 888,73	3 897 903
Physical assets and funds relinquished	520 441,35	—	520 441,35	2 187 826
Physical assets written off	1 939 447,38	—	1 939 447,38	1 710 077
<i>Total</i>	R219 162 615,73	111 229 710,53	330 392 326,26 ²	274 720 666
<i>Utilization of funds:</i>				
Fixed assets			303 060 488,29	242 395 989
Balance brought forward			242 395 988,56	201 764 276
Net additions			60 664 499,73	40 631 713
Investments			5 157 403,96	5 003 880
Shares in SA Inventions Development Corporation			5 000 000,00	5 000 000
Stocks and shares			157 403,96 ³	3 880
Net current assets			22 174 434,01	27 320 797
Current assets			50 793 769,71	47 890 983
Saleable stock			178 061,23	267 077
Debtors and debit balances			11 822 291,20	12 146 581
Advances and deposits:				
Research grants			6 722 107,66 ^{4a}	308 365
Other			8 426 506,39	7 434 290
Cash:				
Corporation for Public Deposits (CPD)			21 095 136,49 ^{4b}	27 107 154
SA Reserve Bank			2 388 767,98	480 911
Other banks			86 646,10	76 465
Petty Cash Imprests			74 252,66	76 140
Current liabilities			28 619 335,70	20 570 186
Advances for investigations and services			12 108 446,49 ⁵	9 140 969
Creditors and credit balances			16 510 889,21	11 429 217
<i>Total</i>			R330 392 326,26	274 720 666

¹Transfer from operating to building fund R44 858,00.

²At 31 March 1986 contractual obligations against the General and Building Funds were R24 156 271 and R3 395 216 respectively.

³Includes stocks and shares taken over from the Fuel Research Provident Fund R153 523,96.

^{4a & 4b}Advances for Research Grants in 1986/87 already paid in March 1986, resulting in smaller deposits at CPD.

⁵Includes Stabilization Funds in respect of Department of Transport (National Road Fund) R299 403,69.

PRETORIA
6 October 1986

(Sgd.) J D VAN ZYL
Chief Director: Administrative Services

(Sgd.) C F GARBERS
President

The above Balance Sheet has been audited in accordance with the provisions of section 42(4) of the Exchequer and Audit Act, No. 66 of 1975 read with section 16(1) of the Scientific Research Council Act, No. 82 of 1984, and in my opinion it has been drawn up so as to reflect a true and fair view of the financial affairs of the Council for Scientific and Industrial Research.

PRETORIA
11 December 1986

(Sgd.) J DE LOOR
Auditor-General

Financial statements

NOTE 1: CAPITAL INCOME

	General Fund R	Building Fund R	1986 R	1985 R
Parliamentary grant	31 065 000,00	6 110 000,00	37 175 000,00	30 509 000
Donations	—	—	—	22 734
Contributions	227 474,25	—	227 474,25	67 700
Interest	—	5 306 880,62	5 306 880,62	4 935 221
Sale of assets written off	380 897,35	—	380 897,35	446 663
Investigations and services	6 322 121,96	—	6 322 121,96	3 484 273
Sale of land and buildings	—	—	—	35 300
Surplus on sale of leasehold property	—	7 833,93	7 833,93	141 538
Coal levies	287 000,00	—	287 000,00	—
	R38 282 493,56	11 424 714,55	49 707 208,11	39 642 429

NOTE 2: FIXED ASSETS (AT COST OR VALUATION)

	Land and Buildings R	Books and Journals R	Furniture and Equipment R	Prefab. Structures R	Laboratory Equipment R	Vehicles R	Stores Stock R	Total R
Balance brought forward	94 938 598,32	7 309 602,20	8 320 623,38	63 861,24	126 320 074,37	4 138 044,16	1 305 184,89	242 395 988,56
<i>Purchases:</i>								
CSIR	6 582 068,54	2 136 678,93	1 877 106,96	17 454,54	50 641 276,27	537 751,21	—	61 792 336,45
Grants	—	1 267,65	4 772,35	—	—	—	—	6 040,00
<i>Adjustments previous year:</i>								
CSIR	—	120 754,46	59 471,55	—	—	1 791,67	—	182 017,68
Grants	—	—	—	—	—	—	—	—
<i>Received:</i>								
CSIR	—	—	9 147,42	—	669 579,74	3 500,00	—	682 227,16
Grants	—	—	—	—	—	—	—	—
Stores Increase	—	—	—	—	—	—	472 452,42	472 452,42
	101 520 666,86	9 568 303,24	10 271 121,66	81 315,78	177 630 930,38	4 681 087,04	1 777 637,31	305 531 062,27
Less: Reductions	—	4 880,00	121 658,33	250,00	2 192 952,04	150 833,61	—	2 470 573,98
Relinquished	—	—	399,19	—	520 042,16	—	—	520 441,35
<i>Written off:</i>								
CSIR	—	4 880,00	121 259,14	70,00	1 662 404,63	150 833,61	—	1 939 447,38
Grants	—	—	—	—	—	—	—	—
<i>Adjustments previous year:</i>								
CSIR	—	—	—	180,00	10 505,25	—	—	10 685,25
Grants	—	—	—	—	—	—	—	—
Balance	R101 520 666,86	9 563 423,24	10 149 463,33	81 065,78	175 437 978,34	4 530 253,43	1 777 637,31	303 060 488,29

Financial statements

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

STATEMENT 2

STATEMENT OF INCOME AND EXPENDITURE FOR THE YEAR ENDED 31 MARCH 1986

	Grants R	CSIR R	Total R	1984/85 R
<i>Income</i>				
Parliamentary grant	14 588 000,00	119 340 200,82	133 928 200,82	121 040 727
Contributions to CSIR projects	9 000,00	2 363 257,57	2 372 257,57	2 032 270
Coal levies and penalties	—	2 303 141,60	2 303 141,60	2 075 966
Investigations and services	—	61 609 175,11	61 609 175,11	54 651 200
Publications	596,27	709 832,54	710 428,81	766 700
Sundry	34 799,30	1 273 294,71	1 308 094,01	1 131 291
<i>Total</i>	R14 632 395,57	187 598 902,35	202 231 297,92	181 698 154
<i>Less: Expenditure</i>				
Salaries, wages and allowances	147 615,12	122 508 426,52	122 656 041,64	119 732 549
Consumable stores and services	42 842,09	50 708 529,12	50 751 371,21	41 159 797
Subsistence and transport	59 940,71	5 962 946,98	6 022 887,69	5 169 665
General expenses	1 197,46	13 714 411,88	13 715 609,34	13 411 096
Extraordinary expenses	—	155 462,41	155 462,41	2 572
Grants	12 572 007,08	7 629 050,78	20 201 057,86	14 720 352
Subsidies: Research by industry	—	1 342 434,56	1 342 434,56	1 369 289
Levies and depreciation	453 252,36	21 415 611,96	21 868 864,32	19 860 448
<i>Less: Income internal services</i>	13 276 854,82	223 436 874,21	236 713 729,03	215 425 768
	8 707,90	41 817 352,98	41 826 060,88	37 235 538
<i>Income over expenditure</i>	R1 364 248,65	5 979 381,12	7 343 629,77	3 507 924

PRETORIA
6 October 1986

(Sgd.) J D VAN ZYL
Chief Director: Administrative Services

(Sgd.) C F GARBERS
President

Financial statements

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

STATEMENT 3

CSIR BUDGET 1986/87

A. OPERATING EXPENDITURE

ACTIVITIES	EXPENDITURE						FUNDS	
	Salaries R	Direct running expenses R	Awards and subsidies R	Total R	Parliamentary grant R	Recoverable Expenditure		
						Internal R	External R	
CSIR laboratories and departments	142 533 877	98 172 429	—	240 706 306	138 461 635	26 690 119	75 554 552	
Grants and subsidies	3 076 922	4 308 121	35 711 232	43 096 275	31 468 365	1 750 240	9 877 670	
<i>Subtotal</i>	145 610 799	102 480 550	35 711 232	283 802 581	169 930 000	28 440 359	85 432 222	
<i>Less: Internal Revenue</i>	—	28 440 359	—	28 440 359	—	28 440 359	—	
<i>Total</i>	145 610 799	74 040 191	35 711 232	255 362 222	169 930 000	—	85 432 222	

B. CAPITAL EXPENDITURE

ACTIVITIES	EXPENDITURE						FUNDS	
	Books/ Journals R	Technical equipment and vehicles R	Furniture/ office equipment R	Bicycles R	Buildings R	Total R	Parliamentary grant R	Recoverable expenditure R
CSIR laboratories and departments	2 448 662	50 309 310	856 628	7 000	13 720 000	67 341 600	63 540 300	3 801 300
Grants to universities, etc.	19 000	1 072 500	60 000	—	—	1 151 500	467 700	683 800
<i>Total</i>	2 467 662	51 381 810	916 628	7 000	13 720 000	68 493 100	64 008 000	4 485 100
<i>GRAND TOTALS A & B</i>						323 855 322	233 938 000	89 917 322

CSIR periodical publications

Annual report of the CSIR

Gratis.

Scientiae

Quarterly. Feature articles and news items on scientific topics. Gratis.

TI – technical information for industry

Irregular. Short articles on aspects of CSIR research with industrial application. Issued by the Industrial Extension Service, National Institute for Informatics. Gratis.

CSIR publications

Quarterly list of articles and reports published under the auspices of the CSIR, with keyword and author indexes. Also contains information on recent translations by the CSIR Foreign Language Service. Gratis.

The CSIR – organization and activities

Regularly updated. A directory of the various divisions and services of the CSIR. Gratis.

Scientific research organizations in South Africa

Every two years. A guide to government organizations, statutory bodies and industrial concerns which maintain research laboratories. Price varies.

Scientific and technical societies in South Africa

Every two years. A guide to societies, giving particulars of their aims and objects, membership, publications, etc. Price varies.

NBRI information sheet

Every two months. Brief articles on technical and practical problems related to building. Gratis.

Housing research review

Irregular. Newsletter of the Housing Research Information Service, National Building Research Institute. Gratis.

Houtim

Quarterly. Technical news for the timber industry, compiled by the National Timber Research Institute. Gratis.

VIA

Abstracts bulletin published twice a year covering all unrestricted technical reports and other publications of the National Institute for Transport and Road Research issued during the preceding six months. Gratis.

SAWTRI bulletin

Quarterly. Technical news for the textile industry compiled by the South African Wool and Textile Research Institute. Gratis.

NEERI news

Quarterly. General newsletter of the National Electrical Engineering Research Institute. Gratis.

Transport and road digest

Irregular. Summaries of research projects giving the background and main results. Issued by the National Institute for Transport and Road Research. Gratis.

GTES newsletter

Irregular. Articles and news items on techno-economic topics. Gratis.

NAC news

Irregular. Short reports on the progress of the National Accelerator Centre. Gratis.

NRIMS current activities

Quarterly. Newsletter containing abstracts of reports recently issued by the National Research Institute for Mathematical Sciences. Gratis.

Appropriate technology newsletter

Irregular. Review articles and announcements regarding appropriate technology. Issued by the Industrial Extension Service, National Institute for Informatics. Gratis.

NCRL news

Six-monthly. General information on the scientific programme and activities of the National Chemical Research Laboratory. Gratis.

Buildings for health and welfare services

Irregular. Research information newsletter. Issued by the National Building Research Institute. Gratis.

NPRL newsletter

Annually. Highlights of activities of the NPRL. Issued by the National Physical Research Laboratory. Gratis.

MTR – Manufacturing technology reviews

Weekly. Brief summaries of selected articles and their sources, compiled by the Industrial Extension Service, National Institute for Informatics. Subscription R12,00 per month; photocopies of articles listed 12 c per page.

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