

Annual Report 1990 - 1991

Council for Nuclear Safety

Table of contents

Chairman's statement
2

Executive Officer's review
4

The Council and its meetings
5

Structure and staffing
7

Licensing
8

Koeberg
10

Operator Licensing
15

Atomic Energy Corporation
16

Other activities
18

Legislation
21

Generic studies
22

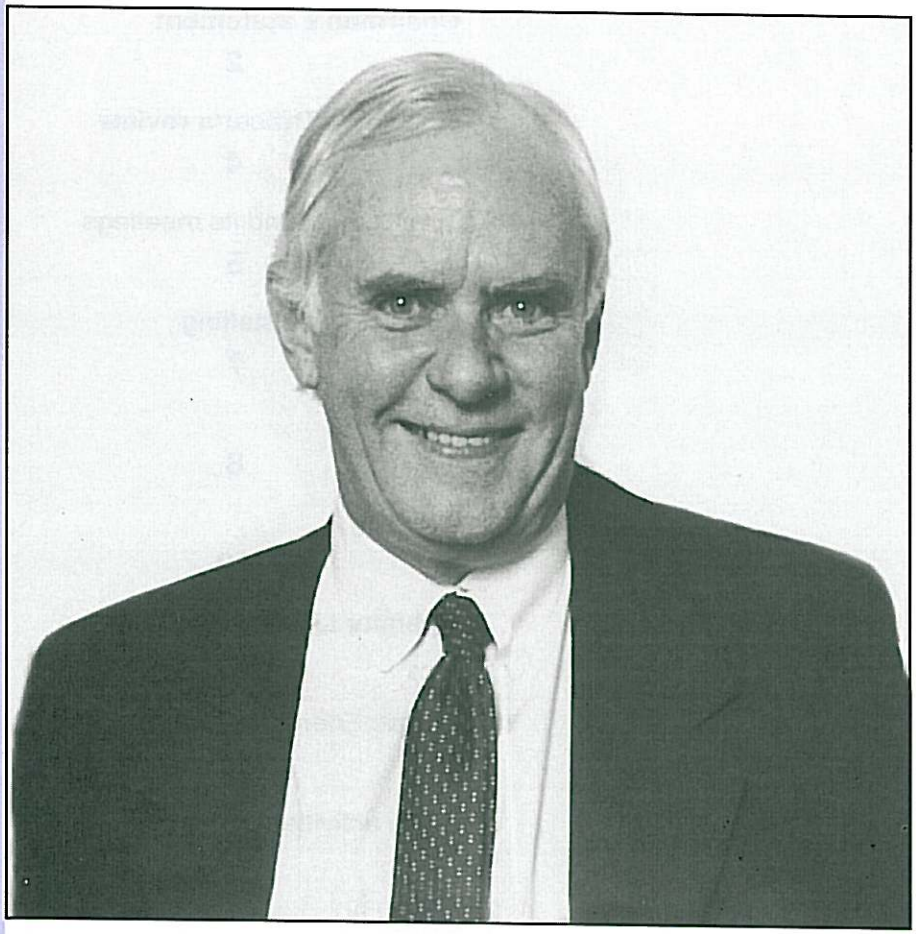
Participation in meetings and conferences
23

Financial statements
26

Income statement
27

Balance sheet
28

Notes to the financial statements
29



Prof J B Martin, Chairman

Chairman's statement

The nuclear industry is a controversial one. It engenders opinions ranging across a broad spectrum - from stalwart support to (sometimes) violent opposition. It is seen, on the one hand, as the solution to the world's energy problems and on the other as a potential disaster to us all, which will leave a hazardous heritage to our successors.

But, despite the controversy, there is a nuclear industry in many countries, including our own, and where there is a nuclear industry there is, and must be, a regulatory body. This body must have the knowledge and the authority to exercise control over all nuclear activities so as to ensure that the industry conforms to standards compatible with health and safety. It must also be backed by legislation which ensures that, should an accident occur, there are no doubts about liability for any resulting nuclear damage nor about payment of compensation in respect thereof.

The Council for Nuclear Safety, in meeting these needs, does not necessarily follow the procedures or adopt the policies of other regulators, either here or abroad. Inevitably, however, whilst the philosophical and practical approaches of regulating bodies may differ, all do have the same broad objectives.

In particular, I would comment on one fundamental regulatory principle, namely, that of independence. In order to discharge, in a fair and unbiased manner, its regulatory function of protecting the general public and the occupationally exposed workforce, it is essential that the regulator be, and be seen to be, free from the influence of promotional, user, financial and, indeed, political interests. The Council has already achieved its independence from promotional and user interests and I can record that it has further consolidated its financial position and, in accordance with its policy, the Council has again, this year, significantly reduced its financial dependence on the State. It is intended that this trend will continue.

From the outset, the Council has been free from any kind of political pressure and I am particularly grateful to Deputy Minister Welgemoed for the support which he has given the Council, both inside and outside Parliament, during the past 12 months.

This past year was the last full term in office of the Council's Executive Officer, Mr J O Tattersall. I and my Council are greatly indebted to him for his work over many years, first in developing an effective regulatory organisation, initially the Licensing Branch of the Atomic Energy Board, and more recently in assisting with the establishment of an independent Council for Nuclear Safety, which is seen to have pioneered a unique regulatory approach now, at last, finding increasing acceptance in the industrialised world.



Mr J O Tattersall, Executive Officer and General Manager

Executive Officer's review

The performance of the Council during the past year serves, I believe, to underline both the correctness of the decision to establish a totally independent regulatory body and the satisfactory manner in which the transfer of authority and expertise from the Atomic Energy Corporation to this new body was accomplished. The high standard of technical competence within the organisation has in no way suffered as a result of the change and, indeed, continues to benefit from increasing experience and from our ongoing programme of refining and improving techniques. Similarly, the impartiality with which regulatory control is exercised has not been compromised. It has, of course, long been recognised that it is important for regulatory bodies not only to act impartially and independently, but also to be perceived to be able to do so by society as a whole. From various discussions during the year, there can be no doubt that this image of the Council has improved, both locally and overseas, as a result of the final step in the transition to total independence.

That the transition was effected so smoothly and satisfactorily, reflects the dedication of my staff and the co-operation we have received from all parties, including the Atomic Energy Corporation as erstwhile regulator and current licensee, Eskom and

our other licensees, and the Department of Mineral and Energy Affairs.

I am pleased to report that during the past year there has been useful progress in the development of regulatory procedures and techniques relating to nuclear-hazard material within the mining industry. The co-operation received from the Government Mining Engineer and his staff and from the mining industry in this difficult and complex matter is much appreciated.

At the present time the demand for nuclear power in the world at large is comparatively static and even negative in some areas. Among the many reasons for this, such as lack of power demand due to sluggish industrial activity and the factors selected or discarded in comparative economic assessments of power sources, the Chernobyl accident must undoubtedly be included. This tragic event, the full consequences of which are only now being realised, has demonstrated that disastrous accidents can happen and that the risks of such events must be assessed and taken into account by nuclear regulatory authorities. In South Africa, we have held this view from the outset, and it is comforting to see that now, some twenty years later, virtually all regulatory authorities have come around to our way of thinking.

The Council and its meetings

Throughout the year the Council consisted of the following members:

Chairman: Prof J B Martin
Dean, Faculty of Engineering, University of Cape Town

Vice-Chairman: Mr L D Hobbs
Chairman, Rand Water Board

Members

Prof R K Dutkiewicz
Director, Energy Research Institute, University of Cape Town

Mr M du Toit
Chief Director, Development Co-ordination, Department of Development Planning and Provincial Affairs

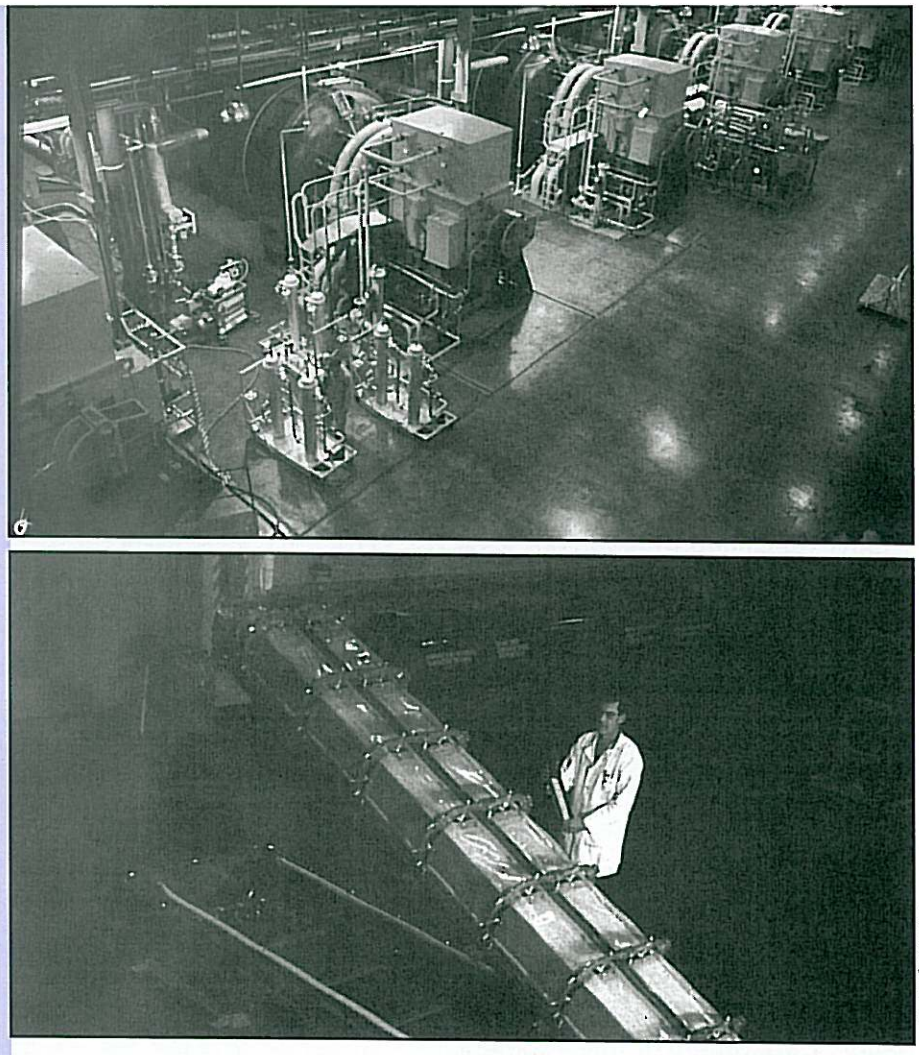
Mr S A Gerber
Chief Director, Environmental Conservation, Department of Environment Affairs

Mr S W A Hanekom
Director, Transport System Planning, Department of Transport

Prof R G Harley
Head, Department of Electrical Engineering, University of Natal

Dr P R Le Roux
Director, Radiation Control, Department of National Health and Population Development

Mr H J Matthysen
Managing Director, National Occupational Safety Association



Courtesy: AEC

Top: Enrichment modules in the AEC's uranium enrichment plant. Below: South African manufactured nuclear fuel assemblies for Koeberg being loaded into their transport cask at the fuel fabrication plant.

Dr D Reitmann
Director, National Accelerator Centre, CSIR

Mr P Scribante
Formerly Director, Mechanical Engineering, SA Bureau of Standards

Dr P D R van Heerden
President, SA Medical Research Council

Prof A F Steyn
(co-opted member)
Head, Department of Sociology, Rand Afrikaans University

With the exception of Mr S A Gerber and Mr S W A Hanekom, who were appointed during the previous year, all Council members were originally appointed during June 1988, when the Council was established as a fully independent nuclear regulatory authority.

Regular Meetings of the Council are held in order to ensure that its function, defined in the Nuclear Energy Act, No 92 of 1982, as amended, of safeguarding the public against the risk of nuclear damage, is fulfilled. This is achieved through the process of licensing, by which proper control over nuclear installations and activities associated with nuclear-hazard material is exercised. In the nuclear industry these encompass the full range of nuclear fuel cycle activities, from mining of uranium and thorium bearing ores to the ultimate disposal of nuclear waste. The

The licensing process covers the full range of nuclear fuel cycle activities

Council must satisfy itself that the risks of nuclear damage are consistent with the requirements of health and safety.

During the year six scheduled meetings were held. One of these took place at the conclusion of a conservation course organised by the National Parks Board at Geelbek, near Langebaan.

The following members of the Council's staff continued to attend all Council meetings to serve in an advisory capacity :

Mr J O Tattersall
Executive Officer & General Manager

Mr B C Winkler
Deputy General Manager

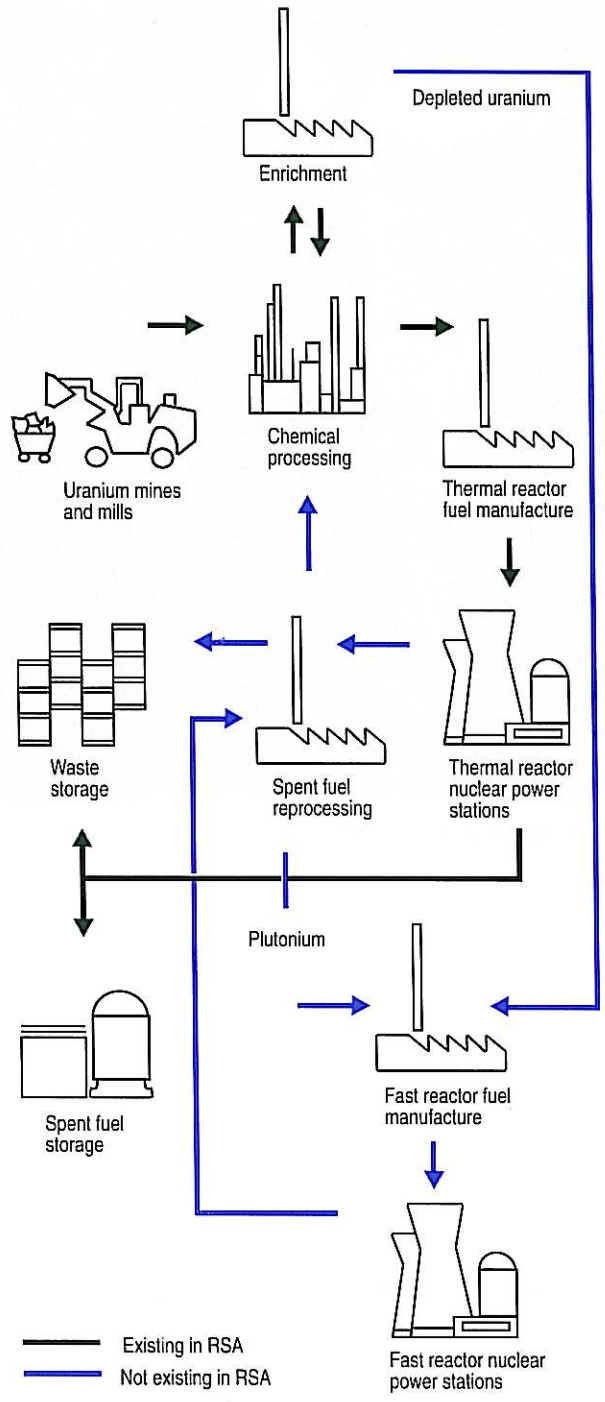
Mr J Leaver
Deputy General Manager

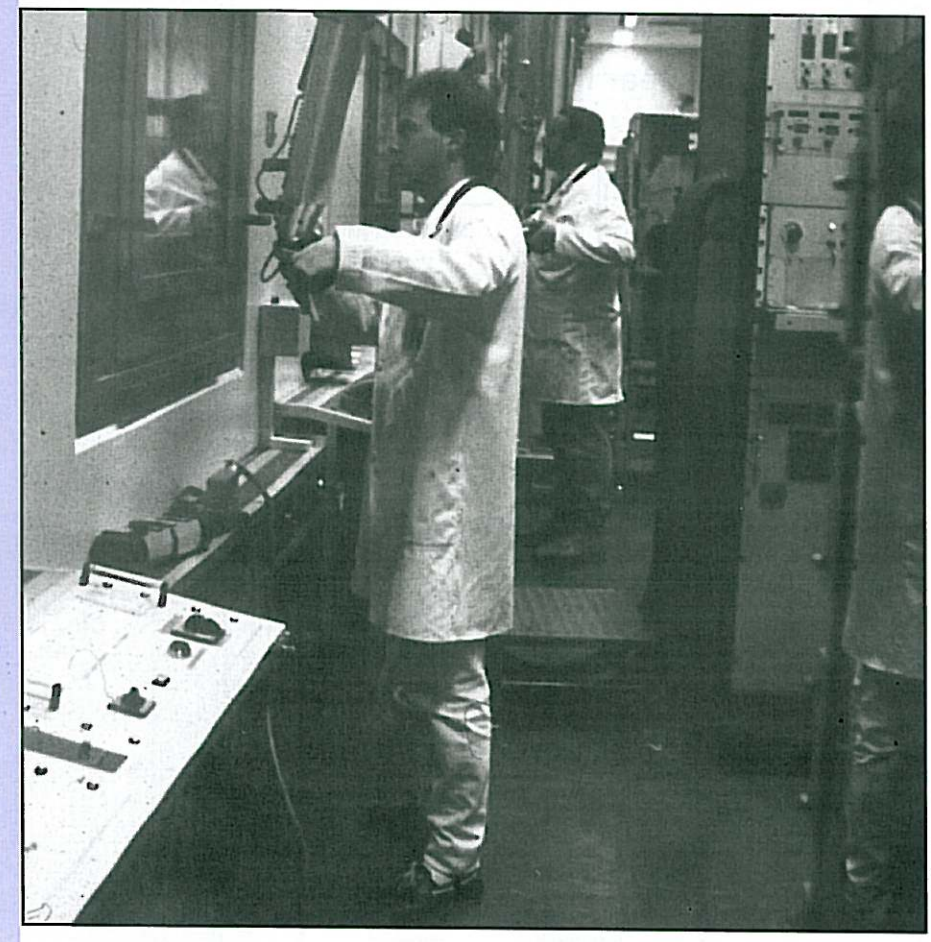
In addition, **Mr E L Langford**, Manager, Central Services Department, acted as Secretary to the Council.

Structure and staffing

The overall organisational structure of the Council has remained unchanged over the year and is shown in diagram 1.

Nuclear fuel cycle





Courtesy: AEC

The AEC's Hot Cell Complex at Pelindaba.

A measure of success was achieved in the recruitment of nine new members of staff but over the same period four members left the service of the organisation. Although the Council operates at some 13% below full strength it has been possible, by focusing on priorities, to attend to the more pressing aspects of our work but with the inevitable postponement of certain important generic work and other issues of lesser urgency. In these difficult circumstances I appreciate the extra efforts made by the Council's staff.

The Staff Association and the Social Club continued to play a valuable role in promoting staff relations.

Public relations

As a body having responsibility for certain aspects of public safety, the Council should have a visible image and to this end should take steps to inform the public about its approach to nuclear regulation and the manner in which it carries out its functions. In pursuing this objective the Executive Officer gave a presentation entitled "*Nuclear Energy and Public Safety*" to an invited audience of civic leaders and local businessmen in Cape Town in November 1990.

Licensing

Licensing structure and activities

The purpose of licensing is to ensure that the risks of nuclear damage to the public, to the occupationally exposed workforce and to property are consistent with the requirements of health and safety. The Council has established fundamental risk standards from which safety standards are derived for each facility or activity which is to be licensed. These are kept under review so that they compare favourably with risks imposed by other industries and reflect any trend toward increased safety standards as time passes.

In practical terms the licensing work, embracing a very wide range of disciplines in natural, applied and human sciences, is conducted by the four departments shown in Diagram 1.

These were established in order to address, inter alia, the main functions of the licensing process, namely, the setting of health and safety standards, the safety evaluation of nuclear installations and activities, the determination of licence conditions, the carrying out of statutory inspections, and the servicing of licences.

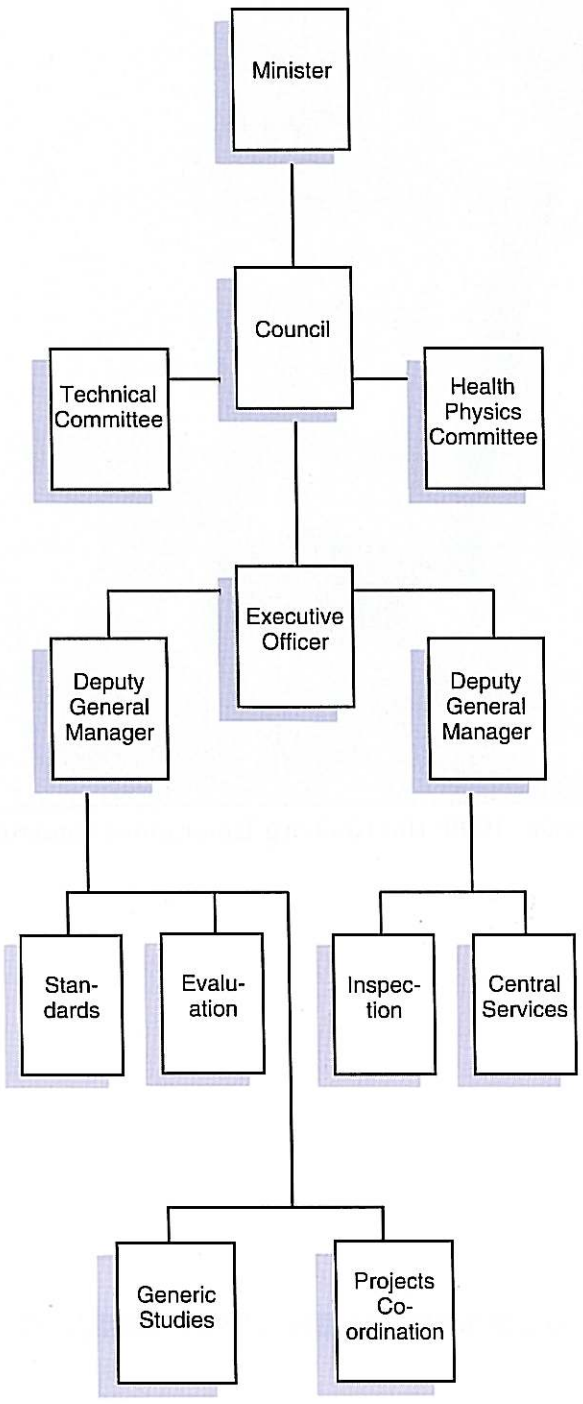
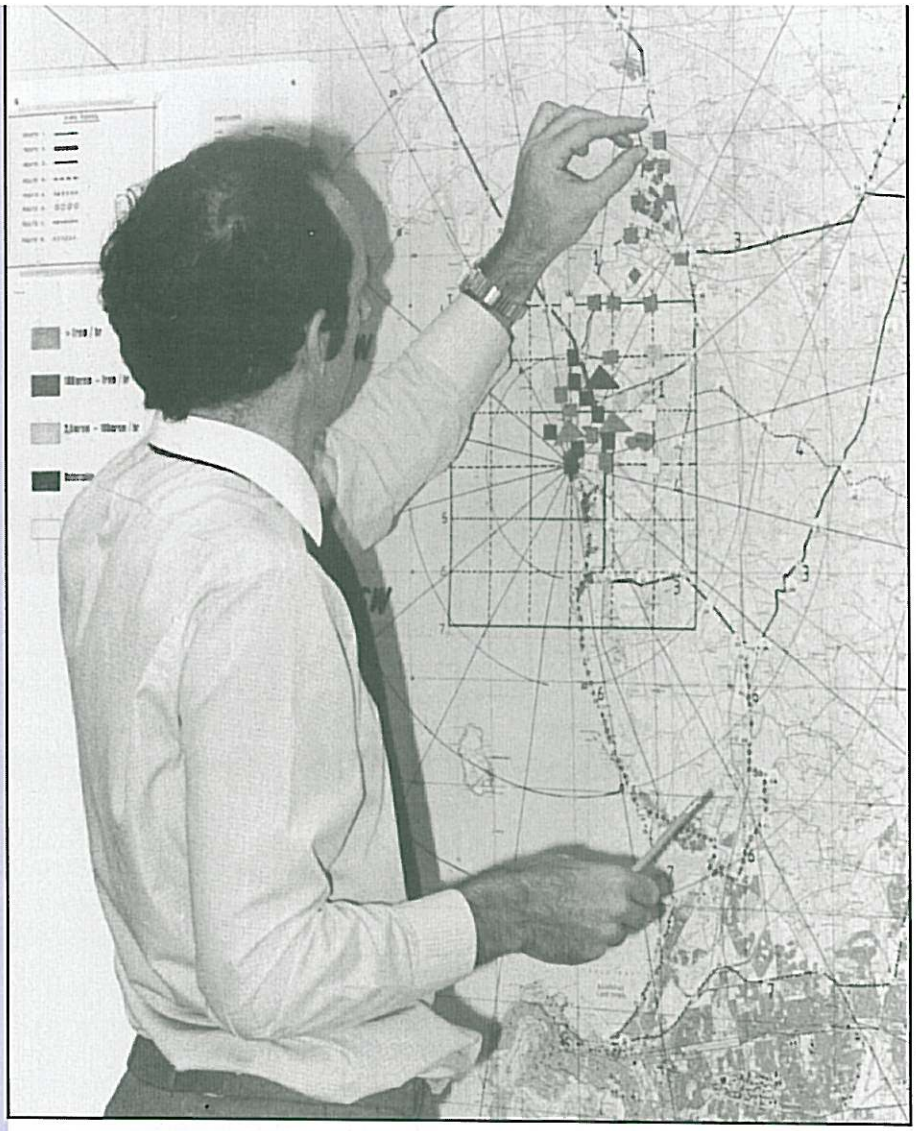


Diagram 1



Courtesy: Eskom

Emergency plan exercise, 1990: the Koeberg Emergency Control Centre.

Koeberg

During the year a variation of the Koeberg licence was granted, to provide for the transport of irradiated fuel pins and fuel assemblies from Koeberg to the AEC's hot cell complex at Pelindaba and to require regular updating of the probabilistic analysis contained in the Intermediate Safety Analysis Report to ensure that it reflected the current operational configuration of the plant.

The licence granted to the AEC for the Pelindaba/Valindaba sites was varied to permit the receipt and storage in the hot cell complex of irradiated test specimens from Koeberg.

Licences were granted to five mines whose activities involved uranium and thorium bearing ore, and licence applications have been received from further mines.

Two licences were granted to incidental users of nuclear-hazard material and the licences of two other such users, who were no longer using the material concerned, were surrendered.

Through liaison with Eskom the Council monitored developments regarding the siting of possible future nuclear power stations.

The licensing project work undertaken by the Council through its four

departments, and facilitated by the Projects Co-ordinator, is reviewed in the following sections.

Koeberg and nuclear hazard control

The control over radiological hazards arising from the normal operations at Koeberg, both to members of the public and to persons occupationally exposed to radiation, was subject to continual monitoring and review by the Council.

The discharge of radloactive material to the environment in both liquid and gaseous effluent remained within authorised levels and radiation doses to the public were correspondingly well within prescribed limits.

Occupational exposure of personnel occurs during normal operational activities; the most significant exposures, however, occur during maintenance and refuelling periods. To date Koeberg has maintained an excellent record of controlling radiation doses to workers and this year was no exception.

During the maintenance and refuelling outage on unit 2 a total collective radiation dose of 1,04 mansieverts occurred. No individual dose limits were exceeded and the average individual dose was approximately one fifth of the limit imposed by the Council. Very few other nuclear power stations in the world achieve comparable results in controlling radiation doses to employees.

Whilst the licensing process aims to ensure that the likelihood of a major accident at Koeberg remains acceptably small, it is recognised that no major industrial undertaking of such magnitude can be totally infallible. It is therefore considered both prudent and necessary that a viable emergency plan be established and maintained in an adequate state of preparedness. The plan must cater for the whole spectrum of potential accidents associated with the installation and should embody sufficient flexibility to cope with incidents of a relatively minor nature, through to major accidents.

Such a plan is in place at Koeberg and, like all aspects of nuclear safety, is subject to ongoing review and scrutiny. The annual demonstration exercise of the full emergency plan for Koeberg, involving Eskom together with local, provincial and national bodies, took place in June 1990 and was monitored by twenty members of the Council's staff. Whilst, in general, the adequacy of the emergency response organisation was effectively demonstrated, certain shortcomings were ob-



Courtesy: Eskom

Helicopters are used to assist in tracking the radioactive plume during a Koeberg emergency exercise.

served and these were brought to the attention of Eskom, who were required by the Council to identify the root causes and to implement a corrective action programme.

Apart from the routine training and exercising of staff and equipment surveillance, as well as the above demonstration, a major public notification exercise was conducted during May 1990 involving close liaison between Koeberg and the Civil Protection Services of the Western Cape Regional Services Council. The exercise demonstrated that the time scales for public notification prescribed by the Council could be achieved. This aspect of emergency planning and preparedness is subject to continuing assessment by the Council.

During the past year, the Council convened three meetings of the Koeberg Emergency Planning Liaison Committee, which consists of senior representatives of all parties concerned with the Koeberg emergency plan, to consider all aspects related to the plan and its effective implementation. The Committee continued to provide a forum for the consideration of developments in local and national emergency planning as well as international issues.

The Council monitored the treatment of nuclear waste generated

A major public notification exercise was conducted during May 1990

during normal operations and the subsequent transport of evaporator concentrates and miscellaneous low level waste items to the National Radioactive Waste Disposal Facility at Vaalputs.

During one such consignment a mechanical fault on the trailer conveying the waste containers resulted in a tyre catching fire. The radioactive waste containers were not damaged by the fire and there was no release of radioactive material to the environment. It should be noted that the container specifications, as required by the Council, are such that no release would be expected even from much more severe accidents. Further shipments were, nevertheless, suspended until the Council was satisfied with the outcome of the investigation which took place.

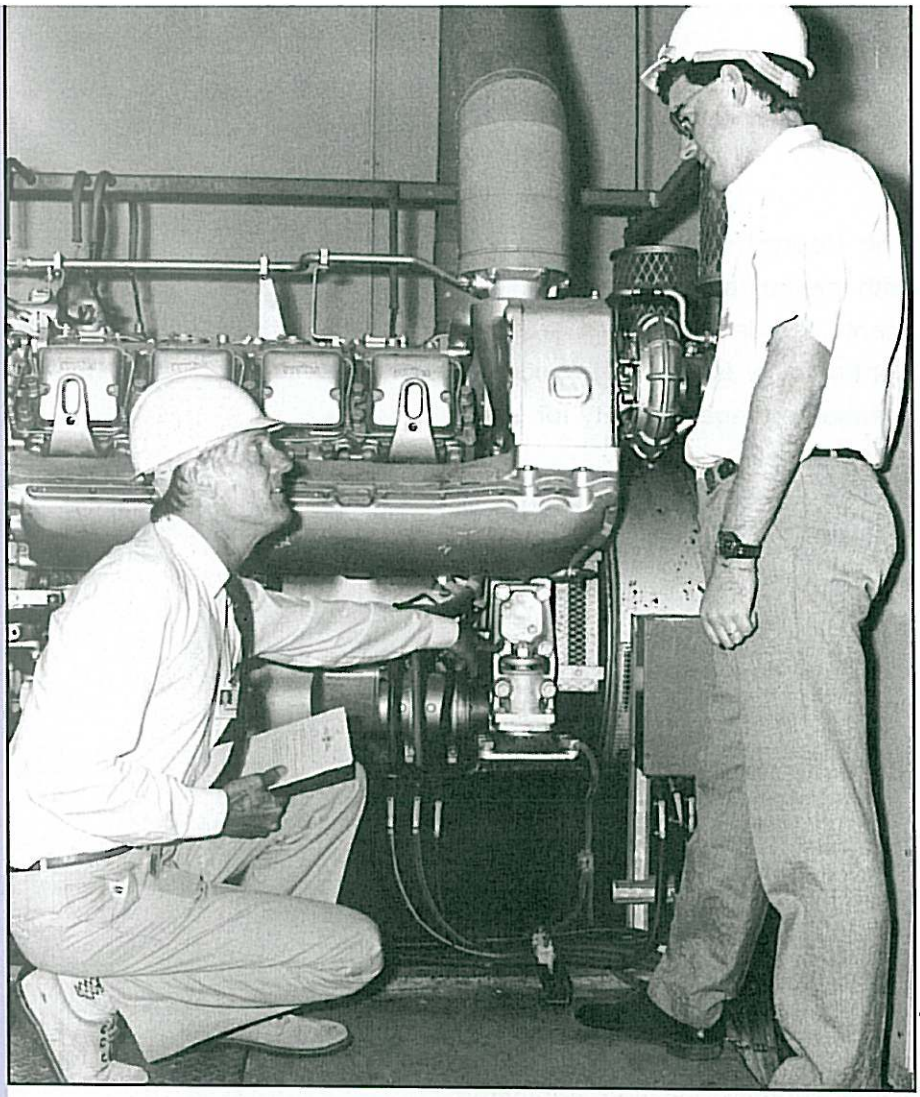
In addition to the monitoring of routine activities, the Council undertook a comprehensive radiological assessment of the extraction of irradiated fuel pins from locally manufactured nuclear fuel assemblies and authorised the operation to proceed. This was successfully completed without incident and the fuel pins were transported to the Atomic Energy Corporation site at Pelindaba for future metallurgical examination.

The Council responded to Eskom with preliminary licensing requirements for design and operational control of a facility to provide increased storage capacity for spent nuclear fuel.

Regulatory control of plant operations is effected through the licence and the Council has established mechanisms whereby changes to plant and operating procedures having a bearing upon nuclear safety are reviewed and appropriately reflected in licence conditions. In this respect, some ninety-three licence change requests were approved by the Council over the past year. In addition, a number of modification proposals, details of occurrences and safety submissions were submitted for review by the Council.

A range of studies has been carried out involving an assessment of the Emergency Response Facility for monitoring the status of the plant, and progress has been made with the development of a computerised data base for carrying out graphical displays of the results of safety analyses.

The Council conducted technical assessments of new and modified fuel handling equipment and granted authorisation for its use.



Courtesy: Eskom

Walk through examinations are a part of the Council's licensing and requalification programme for both reactor operators and senior reactor operators.

Strict criteria are set for the selection of reactor operators

During the year further progress was made in the use of computer codes for effecting regulatory control over maintenance activities, particularly those undertaken through condition-based monitoring. An additional computer code was also installed for performing independent analyses of civil structures.

Licensing requirements include a programme of periodic testing to establish the continuing reliability of all engineered items of plant related to nuclear safety. A regular safety review process necessitates thorough analysis of the tests by the Council's specialists, to provide assurance that the Council's health and safety criteria are being met.

Computer software tools have been developed by Council staff for monitoring and analysing reactor core behaviour, and for performing probabilistic risk assessments and accident analyses. A set of core reload computer codes for use in regulatory submissions was assessed and approved.

The Council's statutory inspection functions of monitoring compliance with the conditions of licence and providing feedback on operational performance, the onset of potential safety problems and the effectiveness and appropriateness of the licence conditions were assiduously

implemented. Our inspectors monitored activities in the normal operating states and the refuelling outages of both units.

Because of the significant impact of in-service inspection on the demonstration of plant integrity the Council continued to have substantial involvement in activities in this area. During the year the Council closely monitored the first in-service inspection of the unit 1 reactor pressure vessel, the results of which were satisfactory.

Conscious of the paramount role of control room operating staff the Council conducts licensing examinations of reactor operators (See box) and has set strict criteria for the selection of candidate operators, involving medical, psychological and aptitude testing. Eskom is responsible for training operators and preparing them for the Council's licensing examinations, which take place at intervals throughout the year. In this respect, the Council renewed thirty-four licences and granted fourteen new licences during the year under review.

Further work was conducted to assess the implications of demographic developments around Koeberg, since the Council has expressed concern that extensive population development there may compromise

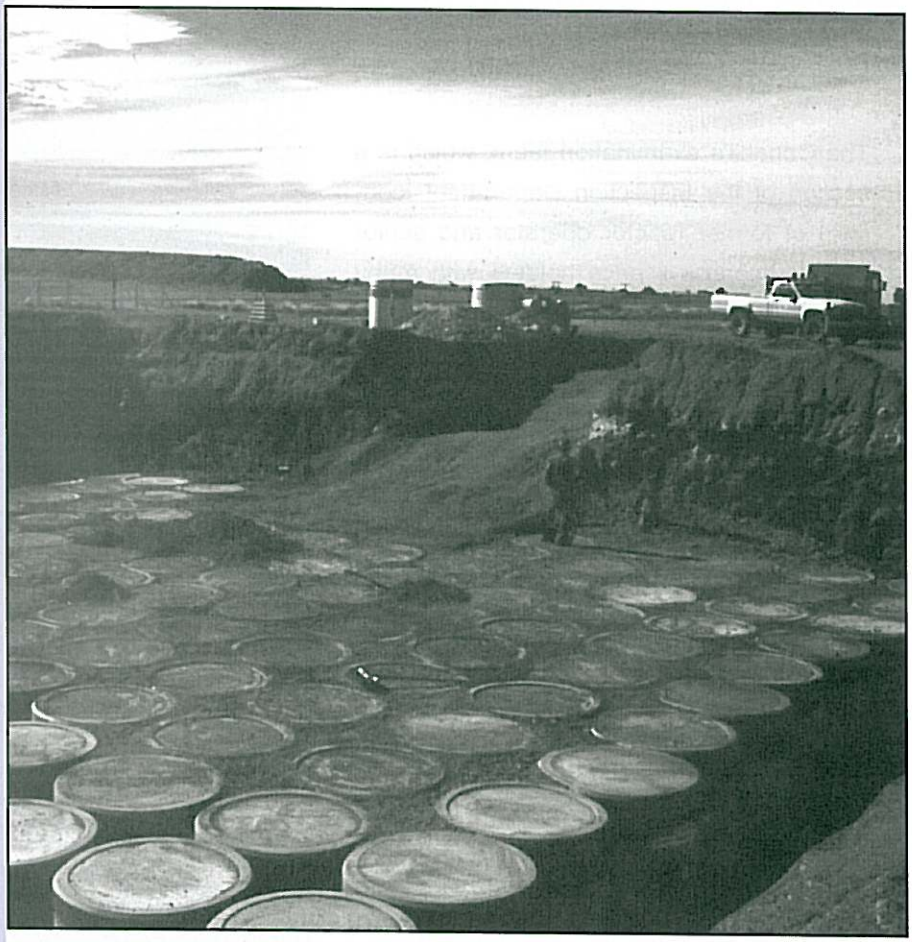
Operator licensing examinations

The Council's examination team, which is a section of the Inspection Department, consists of former reactor operator and senior reactor operator licence holders with many years' operating and training experience.

Examinations are conducted in three phases, viz. a six hour written examination on knowledge and theoretical understanding of nuclear operating principles, safety systems and emergency operations; an examination on the Koeberg fullscope simulator, which closely replicates the control room and plant behaviour; and a "walk-through" of the plant and control room where the candidate demonstrates his knowledge and understanding of the procedures, components, locations, and administrative requirements associated with plant operations and safety.

Examinations are set in two grades, reactor operator (RO) and senior reactor operator (SRO). SRO candidates are required to hold a current RO licence and to have had several years' plant/ shift experience at Koeberg. Successful candidates are granted licences in the appropriate grade, which are valid for two years before requiring renewal. All licensed operators are subject to regular retraining and requalification.

The examination team constantly monitors the best practices in the international nuclear training field so as to be aware of aspects and techniques which may be adopted to enhance the standard of safety and professionalism in South African nuclear operations.



Courtesy: AEC

The National Radioactive Waste Disposal Facility at Vaalputs.

Atomic Energy Corporation

compliance with safety criteria and render the emergency plan ineffective. The Council's representation on the relevant local planning committees has been maintained in order to provide appropriate advice.

AEC production and research activities

The AEC's fuel cycle and research and development activities are subject to regulatory control through the granting of two nuclear licences, one covering the facilities on the Pelindaba/Valindaba sites, and the other pertaining to the National Radioactive Waste Disposal Facility at Vaalputs.

Following the incorporation of the AEC into the formal licensing process it was necessary to re-evaluate certain safety assessments. In this respect the safety assessment for Safari-I was completed and assessment work was carried out on several other facilities. In addition a schedule was established for the submission of details of controls relating to employees' occupational exposure, effluent discharges, waste disposal and emergency planning.

The Council granted a licence variation to the AEC to permit the receipt and storage at the Hot Cell Complex

of four irradiated fuel pins from Koeberg. In addition, following the completion of a radiological safety assessment, permission was granted for the Corporation to discharge 10^9Bq of ^{85}Kr for the purpose of calibrating fuel pin leakage test equipment in the complex.

The safety assessment submitted previously for the AEC's nuclear fuel fabrication facility was re-evaluated against the criteria for operator risk arising from accidents. The results of this re-evaluation were favourable and met the criteria laid down by the Council.

Work progressed on the development of a compliance inspection programme to cover all licensed projects at the AEC. Several preliminary inspections and liaison visits were carried out to assist AEC staff in the production of procedures and systems to establish the Council's reporting requirements.

Licensing of activities involving nuclear-hazard material within the mining industry

In the Annual Report of the Council for 1989, I reported that consensus had been reached with the Government Mining Engineer on the approach to be adopted regarding the regulatory control of radiological hazards within the mining industry. This entailed the licensing of activities involving the mining and processing of ores containing nuclear-hazard material.

Early in 1990 the Chamber of Mines addressed various concerns to the Deputy Minister regarding the question of which mines would have to be licensed; the provision of financial security in respect of liability for nuclear damage; and the avoidance of duplication of effort in the development of assessment, monitoring and control techniques. These were resolved by a committee under the chairmanship of the Government Mining Engineer and at this stage fourteen major uranium processors, both past and present, are to be licensed. Three mines have been scheduled for initial assessment and evaluation of the assessment techniques, the mines in question being Oryx, Hartebeestfontein and Vaal Reefs.

A seminar on the licensing process was held by the Council in July 1990 and was attended by seventy-two representatives from the industry. A National Liaison Committee was established with representation from the Council, the office of the



Courtesy: Eskom

Low level and intermediate level radioactive waste from Koeberg is transported by road to the National Radioactive Waste Disposal Facility at Vaalputs.

Government Mining Engineer, the mining companies concerned and the Chamber of Mines. Two meetings took place in August and November respectively. Draft guidelines on assessment of radiological hazards were issued to the industry by the Council in September 1990.

A Regional Liaison Committee was established to co-ordinate work on the three mines and met in September and November. The Council commenced hazard assessment at the Oryx mine in November 1990. This has continued into 1991 and is being taken over progressively by mine personnel. To date licences have been issued for activities involving nuclear-hazard material at the Oryx, Randfontein Estates, Western Areas, Richards Bay Minerals and Palabora Mining Company mines.

It is recognized internationally that the majority of occupational exposure to radiation occurs within the mining industry. It is also clear that the assessment, monitoring and control of such exposure is a very complex and potentially costly process. Progress to date in this area has been limited owing to extensive negotiation of the procedural approach to be adopted, the large scale of mining operations involved and the shortage of expertise within the mining industry to carry out the necessary work involved.

Other activities

Incidental users of nuclear-hazard material

Apart from the mining industry there are several other incidental users of nuclear-hazard material where such material, in most instances very small quantities, is not used for its radioactive properties. Although the associated risk of nuclear damage is small, sensible precautions must nevertheless be taken and standard licences have been granted to users of very small quantities. During the year licences were issued to two such users and two licences were surrendered; the total number of such licensees is twenty-one.

Transport of radioactive material

The Council for Nuclear Safety is the nominated National Competent Authority in terms of the International Atomic Energy Agency Regulations for the Safe Transport of Radioactive Materials. The responsibilities of the National Competent Authority are, inter alia, the certification of package designs for transporting radioactive material based on a thorough engineering assessment and testing of the packaging material. During the year certificates were issued in respect of the shipment of spent fuel pins from Koeberg to Pelindaba, and the shipment of a ^{60}Co irradiator from Nelspruit to Potchefstroom by Special Arrangement.

Safety standards

The Council's fundamental safety standards were revised some two years ago and development work on the establishment of derived standards and the methodology for demonstrating compliance was continued during the year. Presentations in this regard were made to both Eskom and the Atomic Energy Corporation.

Work has continued on upgrading the Council's accident consequence assessment capability.

Medical control of radiation workers

Persons occupationally exposed to radiation are subject to various controls to ensure that the risk of nuclear damage remains at an acceptably low level. Part of this control regime entails ensuring that each individual worker's state of health remains compatible with the conditions within which he is required to work. Various developments have taken place internationally concerning the degree of medical surveillance exercised over such workers.



The Nuclear Occurrence Communications Centre at the Council's Verwoerdburg offices.

An established emergency plan for Koeberg and environs is in place

The position of the Council in this regard has been reviewed and guidance documents have been updated with the assistance of a medical consultant.

Long term and far field emergency planning

As indicated elsewhere in this report, a well established emergency plan for Koeberg and its environs is in place; however, it has become clear that planning at both the provincial and national levels is in need of further development.

The relevant issues have been identified by the Council and discussions have been held with several interested parties with a view to identifying existing structures and organizations which could play a part in such a response scheme. Proposals have been formulated for implementing these.

Connected to this issue, the Council has established a "Nuclear Occurrence Communication Centre" at its offices in Verwoerdburg.

Radiation exposure of council employees

On occasions, several members of the Council's staff are required to

work in radiologically controlled areas where occupational exposure to radiation can arise. Such employees are subject to the necessary controls entailing medical surveillance, individual dose monitoring and training. During 1990, none of the Council's staff incurred radiation doses of any significance.

Legislation

Draft legislation was prepared for the removal of Chapter III from the Nuclear Energy Act in order to produce a separate Act to provide specifically for all aspects of the Council's regulatory responsibilities associated with the nuclear fuel cycle. Parliamentary time limitations, however, prevented the submission of this proposed legislation, which was consequently held in abeyance. An amendment of two sections dealing, respectively, with the financial security required from licensees and liability for nuclear damage, was accepted at its second reading in Parliament in February 1991.

Further consideration continued to be given to the aforementioned proposed legislation with a view to submitting it at the earliest possible date.

Staff members of the Council participated in two meetings convened

Nuclear occurrence communications centre

The Council's nuclear occurrence communications centre at its Verwoerdburg offices is equipped with data acquisition and display facilities, communication equipment and other facilities needed to enable it to respond to major nuclear occurrences.

The Council's role in this regard is one of monitoring the licensee's response to any accident to ensure that such response is adequate.

It must determine the area affected by any radioactive release which may result from the accident and obtain and record the names of any persons who may have been present within that area at the time of the accident.

It must also advise the Government on the evolution of the accident and on the allocation of resources and any other matters related to the accident, its control, and subsequent rehabilitation activities.



Courtesy: Eskom

As part of the continuing programme of environmental monitoring, measurements are made of radioactivity in samples of food chain products grown or found in the area around Koeberg.

Changes to legislation are to be proposed

by the Department of Foreign Affairs to discuss matters of common interest to South Africa and Namibia, including nuclear safety, following the independence of Namibia, with a view to entering into bilateral agreements between the two countries.

Generic studies

Work has continued on the development of mathematical models for application to reliability studies of safety related systems and materials. Additional support in this respect was obtained through the following sponsored research projects.

- University of the Orange Free State – *Uncertainties in failure rate models*
- Human Sciences Research Council and University of the Western Cape – *Measurement model for high risk personnel*
- University of Cape Town – *Slow strain rate mechanisms*
- Department of Material Technology, AEC – *Environmental mechanisms in ferritic and stainless steel used*

in the manufacture of pressure boundary components of a nuclear power plant

Data obtained from the last two mentioned above were presented to the International Cyclic Crack Growth Research Committee, of which the Council is a full member, and have been used to motivate changes to the ASME XI pressure vessel code.

The Council continued to contribute to an international materials database committee, the Electric Power Research Institute (EPRI) Database for Environmentally Assisted Cracking, and is also represented on an International Co-operative Group on Irradiation Assisted Stress Corrosion Cracking (IASCC). Dr K D Bogie, who represented the Council on both of these, was nominated a member of the Executive Committee of the IASCC group during the year.

Participation in meetings and conferences

In accordance with the Council's policy of keeping abreast of matters pertaining to nuclear safety and regulatory control ten members of staff have attended conferences and technical meetings in Austria, France, Greece, the United Kingdom, the United States of America and West Germany on various aspects of reactor operational safety, radiological protection and radioactive waste management.

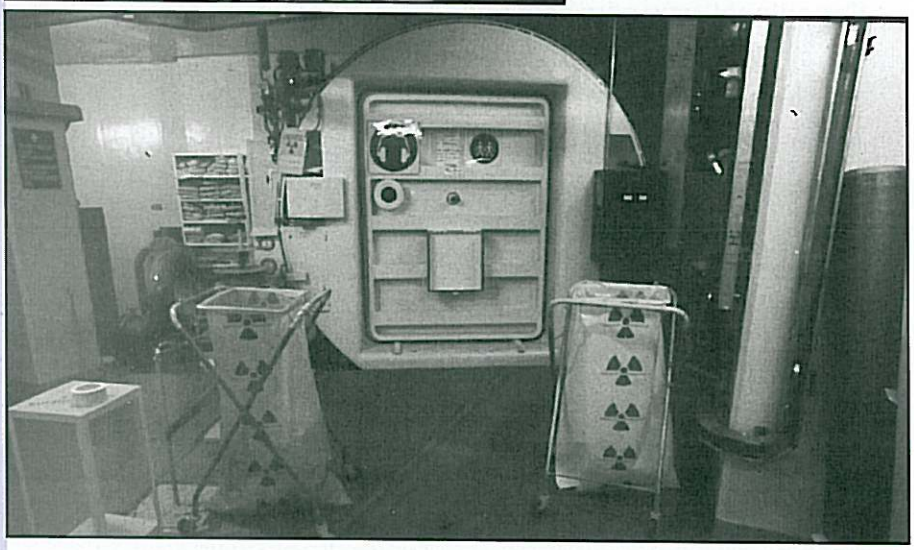
- Mr N R Henderson, Inspection Department, was nominated as the national co-ordinator for South Africa for the International Atomic Energy Agency's (IAEA) Incident Reporting System (IRS) and also as the responsible national officer for reporting in accordance with the IAEA International Nuclear Event Scale.

- Mr A C Hall, Manager, Inspection Department, participated in a Technical Committee Meeting on Safety Indicators for Nuclear Power Plant Operation convened by the IAEA in Vienna.

- Mr B C Winkler, Deputy General Manager, as Vice-Chairman of Committee 4 of the International Commission on Radiological Protection, attended the regular meetings of the Committee, held in Austria and Switzerland.

- Mr J Leaver, Deputy General Manager, was an advisor to the South African delegation to the Thirteenth Meeting of Contract-





Courtesy: Eskom

Koeberg Nuclear Power Station: Top - a reactor control panel; Below - the personnel access door to a reactor containment.

ing Parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, held in London.

- Dr K D Bogie, Head : Generic Studies, presented a paper at the IAEA sponsored specialists' meeting on sub-critical crack growth, held in Moscow.

The Council's Evaluation Department organised a national technical meeting for users of the Main-Opt computer code, used for plant maintenance programmes and for trending in-service operating data.

Publications

A paper on "*The Role of Decision Analysis in Reliability and Quality Assurance*" by Dr K D Bogie, was published in a special "*Quality and Reliability*" issue of *Technology SA.*

Conclusion

Overall, it has been a successful year, with the Council able to meet its obligations satisfactorily whilst still recognising and responding to the need, in the present difficult economic climate, to reduce demand on

It seems likely that the demand for nuclear power will increase

the nation's resources to a minimum.

For the future, with no new, viable major sources of power generation in view and with a world largely committed to a goal of acquiring more, and more sophisticated, material possessions, it seems likely that the demand for nuclear power will increase substantially sometime during the next decade or so, if only because of the pressures exerted on the environment by other power sources.

The Chernobyl accident has revived interest in so-called passive or intrinsically safe reactors. Much effort is being focused in this direction by the nuclear industry, and it may be that we shall see the introduction of a range of plants so classified. The aim is a worthy one, but regulators must not be lulled into complacency by the terminology. Even if the concept were found to be theoretically achievable - which is unlikely - the practical implementation must inevitably involve man's intervention in the detailed design, construction and operation, and the plant so built must be subject to the vagaries of the natural environment.

Sadly, neither man nor nature is passive or intrinsically safe. Nevertheless, we believe that provided there is proper attention to safety aspects and constant vigilance on the part of the regulatory authorities, nuclear power can safely play an increasing role in the world energy scene.

As an independent body the Council has adopted the policy of funding its activities from fees paid by licensees. During the year the proportion of State funding decreased to 50% of the Council's income. This was in accordance with the financial targets established by the Council to phase in licence fees progressively over the next few years to meet seventy per cent of the Council's budget. The annual financial statements were approved by the Council on 15 July 1991 and were signed on behalf of the Council by Mr B C Winkler, Executive Officer and Mr E L Langford, Manager: Central Services Department.

Auditor-General's report

The accounts of the Council for Nuclear Safety have been audited in terms of section 5 of the Auditor-General Act, No. 52 of 1989, read with section 26(4) of the Nuclear Energy Act, No. 92 of 1982, as amended, and in my opinion the annual financial statements are a fair representation of the financial position of the Council as at 31 March 1991 and the results of its operations for the year then ended.



Auditor-General (Pretoria)

Financial statements

Income statement

for the year ended 31 March 1991

	Notes	1990/91 R	1989/90 R
Income		**13 165 093**	14 301 534
State contribution		**6 553 000**	5 785 000
Licence fees	2	**5 498 158**	7 883 273
Interest		**1 095 856**	546 611
Sundry		**18 079**	86 650
Less: Expenditure		**11 366 244**	8 939 824
Personnel expenses		**6 394 420**	5 420 753
Subsistence and transport expenses		**2 048 081**	1 560 795
Consultancy		**142 383**	63 883
Publications		**44 737**	13 178
Rent, accommodation		**648 826**	550 046
Repairs and maintenance		**22 949**	15 230
Research contracts		**259 249**	227 920
Postal, telex and telephone services		**78 584**	104 383
Consumable stores		**59 453**	43 041
Sundry expenditure	3	**932 048**	413 733
Depreciation		**735 514**	526 862
Income over expenditure		**1 798 849**	5 361 710

Balance sheet

for the year ended 31 March 1991

	Notes	1990/91 R	1989/90 R
Capital employed			
Capital	4	**180 799**	180 799
General fund		**8 950 290**	7 151 441
Balance at 1/4/90		**7 151 441**	1 789 731
Plus: Income over expenditure		**1 798 849**	5 361 710
		9 131 089	7 332 240
Employment of capital			
Fixed assets	5	**2 395 808**	2 088 060
Net current assets		**6 735 281**	5 244 180
Current assets		**7 097 769**	5 294 171
Petty cash			
– Council for Nuclear Safety		**1 000**	1 000
– KOEBERG site office		**400**	400
Petrol deposit		**2 000**	2 000
Key deposit		**20**	20
Bank balance		**6 274 195**	4 323 889
Sundry debtors	6	**820 154**	966 862
Less			
Current liabilities		**362 488**	49 991
Sundry creditors	7	**362 488**	49 991
		9 131 089	7 332 240

1. Accounting policy

1.1 Introduction

The financial statements were compiled on the historical cost basis.

1.2 Fixed assets

Furniture and equipment are valued at cost price minus accumulated depreciation.

1.3 Depreciation of fixed assets

Furniture and equipment are written off on a straight line basis over the expected useful life of the asset.

No depreciation is written off in respect of assets taken over from the AEC.

2 Licence fees

Licence fees received in 1989/90 included R 3 198 458 in respect of payment of fees in arrears.

3. Sundry expenditure

	1990/91 R
Stationery and printing	109 012
Entertainment	11 639
Membership fees, professional associations	6 879
Licences	32
Cleaning services	12 804
Bank charges	5 224
Regional Services Council	20 834
Insurance	25 735
Audit fees	7 076
Rent, office equipment	95 175
Maintenance and service contracts	201 400
Computer time	16 905
Analytical chemistry	4 338
Medical and whole body count expenses	10 029
Translation work	90
Small works	18 445
Software and programs	297 933
Small capital items, each less than R5 000	88 498
	932 048

Notes to the financial statements

for the year ended 31 March 1991

4. Capital

	1990/91 R
Assets taken over from the AEC	180 799

5. Fixed assets

(Furniture and equipment)

	1988/89 R	1989/90 R	
Assets purchased	1 000 937	1 633 373	
Less: Depreciation	200 187	326 675	
	800 750	1 306 698	
Less: Depreciation	200 187	326 675	
	600 563	980 023	
Less: Depreciation	200 187		
	400 376		1 380 399
Assets purchased		1 043 262	
Less: Depreciation		208 652	834 610
Plus: Assets taken over from the AEC			180 799
			2 395 808

6. Sundry debtors

	1990/91 R
Outstanding licence fees	731 389
Salary advances	4 622
Advances for subsistence and transport	73 029
Debt of present and erstwhile staff members receivable	11 114
	820 154

7. Sundry creditors

	1990/91 R
Unclaimed payments	141
Pay as you earn deductions in respect of Council members payable	269
Licensees' security deposits	2 600
Lost cheques written back	1 956
Outstanding orders	357 522
	362 488

Notes to the financial statements

for the year ended 31 March 1991

Designed and produced by The Business Chain cc