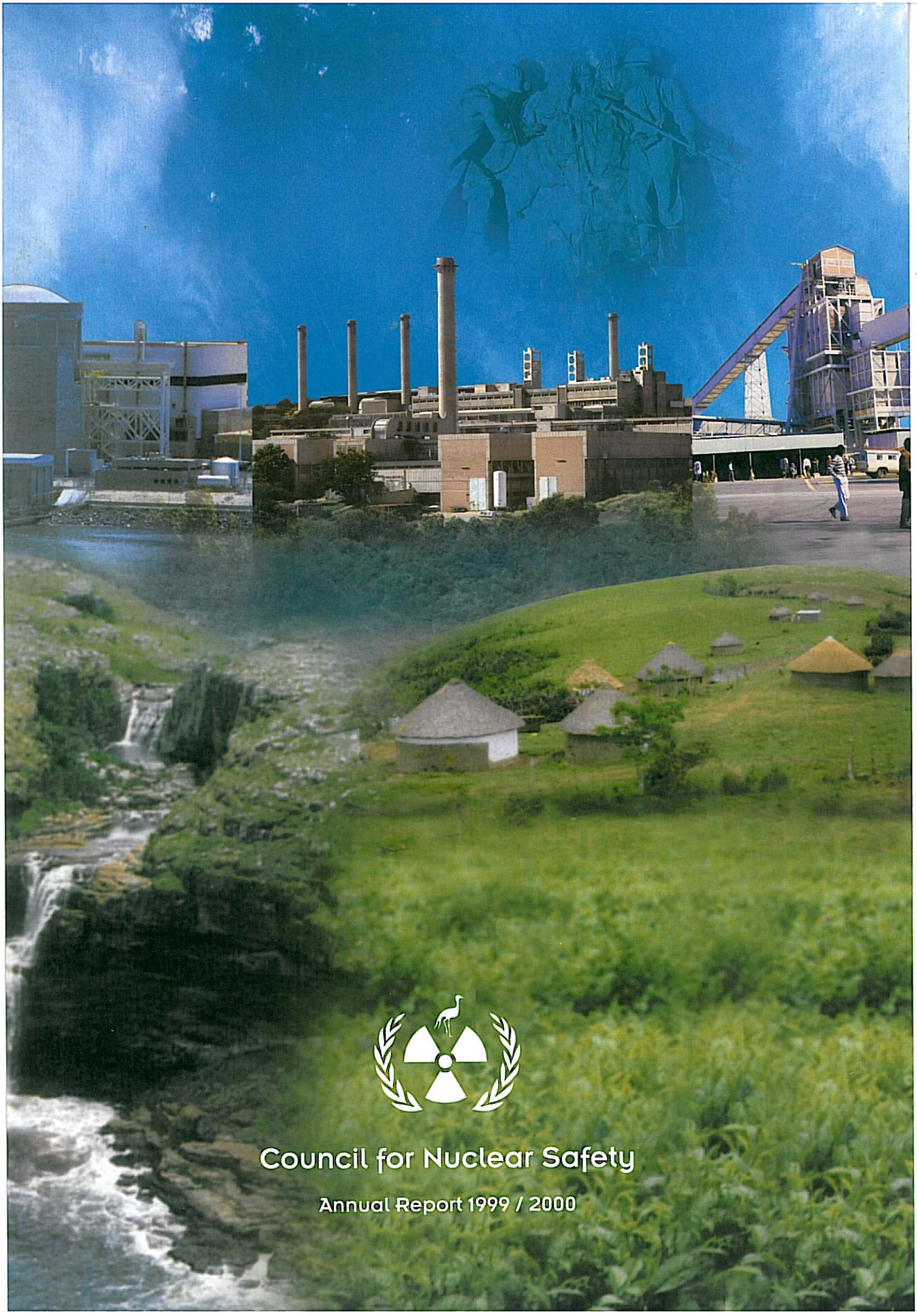


Council for Nuclear Safety

Annual Report 1999 / 2000



The CNS Council members.

Council for Nuclear Safety

Mission Statement
It is the mission of the Council for Nuclear Safety to safeguard persons and their property against the risk of damage from the production or exploitation of nuclear energy and associated radioactive materials in the Republic of South Africa.

Policy
The policy of the Council is:
- to address the risk of nuclear damage through the application of a quantitative risk assessment approach;
- to be cost effective in meeting its objectives and fulfilling its functions;
- to evaluate the extent to which it meets its objectives

Strategy
Its strategy is to accomplish this mission through:
- The exercise of responsible and effective regulatory control,
- The consistent endeavour to maintain the highest level of integrity, professionalism and independence,
- applying the skills of its staff in developing and implementing sound regulatory practices embodying innovative techniques, and maintaining a standard that is comparable internationally.

Contents

THE BOARD 2

CHAIRMAN'S FOREWORD 4

NNR REPORT ON THE ACTIVITIES OF THE ERSTWHILE CNS DURING THE PERIOD 1 APRIL 1999 – 23 FEBRUARY 2000 5

EXECUTIVE OVERVIEW 5

EXECUTIVE SUMMARY 7

- Legal and Management
- Supporting Activities
- Safety Standards and Development
- Licensing Projects
  - *Koeberg*
  - *Pebble Bed Modular Reactor*
  - *Radioactive Waste Management*
  - *Atomic Energy Corporation – Pelindaba Site*
  - *Mining and Minerals Processing*
  - *Administration and Control*

DETAILED NNR REPORT ON THE ACTIVITIES OF THE ERSTWHILE CNS DURING THE PERIOD 1 APRIL 1999 – 23 FEBRUARY 2000 12

A. LEGAL AND MANAGEMENT 12

- A.1 National policies
- A.2 Legislation
- A.3 Council Affairs
- A.4 Management Affairs
- A.5 Supporting Activities

B. SAFETY STANDARDS AND DEVELOPMENT 17

- B.1 Safety Standards
- B.2 Regulatory Tools
- B.3 Information Feedback

C. LICENSING PROJECTS 18

- C.1 Nuclear Power Reactors
  - *C.1.1 Koeberg Nuclear Power Station*
  - *C.1.2 Pebble Bed Modular Reactor*
- C.2 RADIOACTIVE WASTE MANAGEMENT
- C.3 NUCLEAR TECHNOLOGY
  - *C.3.1 Atomic Energy Corporation - Pelindaba Site*
- C.4 MINING AND MINERALS PROCESSING

D. ADMINISTRATION AND CONTROL 36

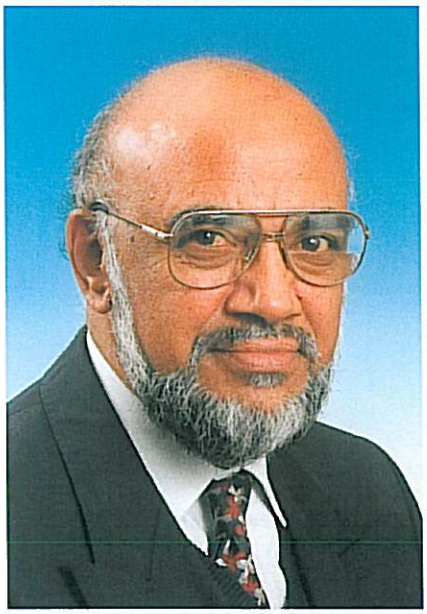
- D.1 Personnel
- D.2 Administration and Information Technology
- D.3 Finance

DIRECTORS REPORT 39

REPORT OF THE AUDITOR-GENERAL 48

FINANCIAL STATEMENTS 50

The Board



Prof K Bharuth-Ram

Prof Krish Bharuth-Ram is head of the Physics Department at the University of Durban-Westville. He holds a doctorate in Nuclear Physics from Oxford University. He has co-authored over 100 international publications and international conference papers and has received numerous scholarships and awards.



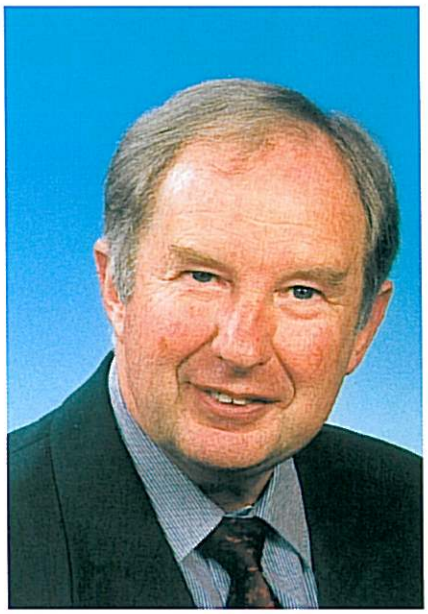
Dr T Auf der Heyde

Dr Thomas Auf der Heyde is Director of the Science Advice Unit and is Senior Lecturer in the Department of Chemistry (UCT). Between 1992 and 1995 he undertook various research projects at Bern, Cambridge and Princeton Universities. He has published 20 papers.



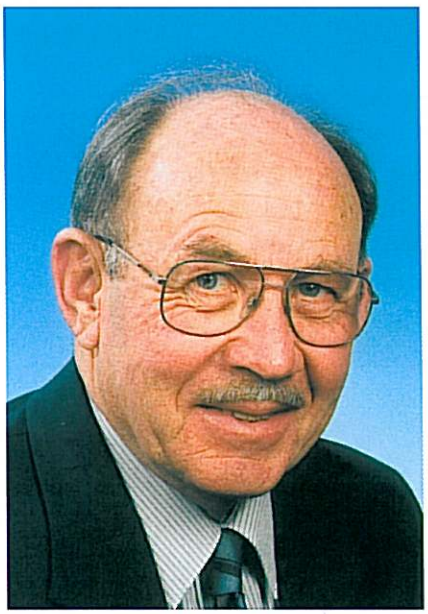
Prof S Taole

Prof Simeon Taole is Dean: Faculty of Science and Technology at the University of the North West. He holds a doctorate in solid state physics from the University of Ottawa and has contributed to numerous publications and conferences.



Prof H Klopper

Prof Hannes Klopper heads the Department of Nuclear Medicine at Tygerberg Hospital, Cape Town. He has lectured and consulted in the field both locally and abroad since 1972, and has 70 publications to his credit.



Dr D Reitmann

Dr Daan Reitmann is a former director of the CSIR's National Accelerator Centre. He holds a doctorate in Physics from Oxford. He has co-authored almost 50 publications and has contributed to numerous local and international conferences.



Mr J Leaver

Mr. Jeffrey Leaver, the acting Chief Executive Officer for the Council of Nuclear Safety, holds a BSc. Hons Metallurgy from Manchester University and is a registered Chartered Engineer. He joined the Licensing Branch in 1975 as a Principal Scientist. He is presently a member of the Council for the Non-Proliferation of Weapons of Mass Destruction, a Council member of the Southern African Institute of Welding and Chairman of Users Society for Engineering Resources and Services.

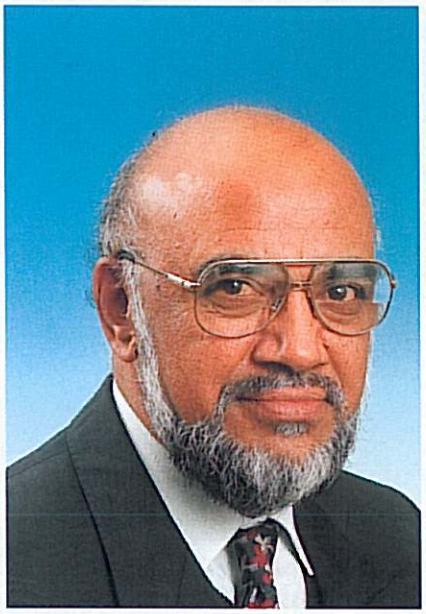
Chairman's Foreword

The CNS is the national authority entrusted with responsibility of exercising regulatory control over the safety of nuclear installations, radioactive waste management, irradiated nuclear fuel, the mining and processing of radioactive ores and minerals, and several other activities associated with radioactive materials.

In many ways this has been quite a traumatic year for the CNS. All at the CNS were deeply saddened by the untimely death of the Chairman of Council, Prof John Martin, in September 1999. Prof Martin led the CNS Council for several years, bringing to it his extreme competency and calm dignity. His has been a very difficult act to follow. The year also saw Mr Bert Winkler take his retirement in December 1999, and Mr Jeff Leaver appointed to act in his place.

After much consultation, the new National Regulator Bill was passed earlier this year. The NNR Act replaces the CNS and its Council with the NNR and a Board of Directors, more clearly defines the role of the regulator and provides for its empowerment to implement the legal provisions of the Act. Most of the concerns raised by the Council and the CNS Executive have been addressed in the new legislation. Interaction between the Council and the Minister and DG of the Department of Minerals and Energy has been very cordial and constructive, as has been interaction with the Parliamentary Portfolio Committee (PPC) on Minerals and Energy.

The CNS continued to exercise the mandate entrusted to it, in overseeing the safety from nuclear hazards of the public and workers at nuclear installations and mines. Safety measures at the Koeberg Nuclear Power Station (KNPS) were subjected to international scrutiny. In addition Council made visits to the KNPS during an emergence exercise, and to the Vaalputs radioactive waste storage facility. The safety performance of the nation's nuclear installations was good.



Prof K Bharuth-Ram

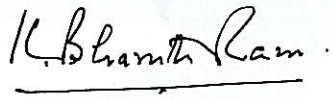


Prof Bharuth-Ram handing over a gift during the farewell function of Mr BC Winkler

Discussions have continued with the mining and minerals processing industries on the extent of exposure to radiation and applicable upper exposure levels to the industry. A workshop is scheduled for early 2000 to arrive at consensus on outstanding issues. Council has continued its open dialogue with other interested and affected parties, in particular, with labour and community representatives, to assure them of the CNS's independence of licensees and government.

In February 2000, Council was invited by the PPC on Minerals and Energy to report on Employment Equity and Affirmative Action (EE&AA) at the CNS. On paper the pace of transformation of the regulator's staff complement appears to be satisfactory. However, the head of the CNS's monitoring committee on EE&AA pointed to several shortcomings in the measures in place, in particular in connection with appointments/promotions to higher management positions and to inadequacy of succession planning initiatives. These are issues that need to be addressed more vigorously by the new Board of Directors.

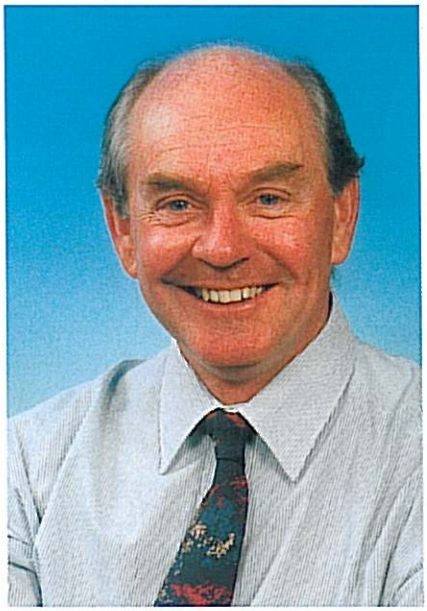
I thank the members of Council for their advice and support during the year, and the executive and staff for ensuring that the CNS carried out its mandate with competency and efficiency.



Professor K. Bharuth-Ram
Acting Chair

EXECUTIVE OVERVIEW

NNR REPORT ON THE ACTIVITIES OF THE ERSTWHILE CNS DURING THE PERIOD 1 APRIL 1999 – 23 FEBRUARY 2000



Mr J Leaver - Acting CEO

The National Nuclear Regulator came into existence in February 2000, superseding the erstwhile Council for Nuclear Safety. The National Nuclear Regulator Act was promulgated to give effect to its establishment. This legislation deals solely with nuclear, radiation, radioactive waste and transport safety, as opposed to the nuclear energy act of 1993 which addressed both regulatory and developmental aspects of nuclear technology and related matters. The development of separate nuclear safety legislation is a significant step towards creating an independent regulatory function separate from the promotional and operational aspects of the nuclear and related industries.

The role of the National Nuclear Regulator remains largely the same as that of the Council for Nuclear Safety. It ensures that workers and members of the public, both present and future generations, and the environment are protected from the potentially harmful effects of ionising radiation associated with a range of activities. These include the mining and processing of radioactive ores and minerals, the processing of uranium and thorium, the production of nuclear fuel, the design, construction, operation and decommissioning of nuclear reactors, the management of radioactive waste and any other activities which could give rise to nuclear damage. Nuclear damage is the harm to persons or the environment or loss of use of property arising from exposure to radiation or contamination with radioactive materials. Excluded from the mandate of the NNR is control over x-ray machines as well as other electronic devices generating ionising radiation and the use and possession of manufactured radiation sources used in medicine, industry and elsewhere. These remain under the control of the Department of Health.

The activities that fall within the sphere of control of the NNR include a number of mining and minerals processing activities in the mining and processing of a range of radioactive ores and minerals. Uranium and thorium are naturally occurring radioactive materials present in the earth's crust at concentrations of a few parts per million. In certain ore bodies these metals, in the form of various minerals, have been concentrated by nature to several hundred or thousand times their average levels, and their exploitation gives rise to significant radiation exposure of the workers concerned. The radioactive waste emitted by these activities also has the potential for exposing members of the public unless properly managed. At present, around seventy mining and minerals processing activities are licensed by the NNR.

In the past, the Nuclear Energy Corporation of South Africa (NECSA), formerly the Atomic Energy Corporation, engaged in extensive uranium refining, conversion and enrichment activities and the manufacture of nuclear fuel for both the Safari and Koeberg reactors. The majority of these activities have, in recent years, been curtailed. However, fuel for the Safari reactor is still manufactured and development work on fuel for the Pebble Bed Modular Reactor is being undertaken at NECSA's Pelindaba site.

The largest project under the control of the NNR is the Koeberg Nuclear Power Station; twin 900-megawatt pressurised water reactors located some thirty kilometres north of Cape Town on the West Coast. Koeberg was built by a French consortium led by Framatome in the late 1970's and has been operational since 1984. It generates around seven per cent of the electricity produced by Eskom, supplying primarily the Western Cape and adjoining areas. The design lifetime of Koeberg is between forty and fifty years.

In addition, NECSA operates a research and radioisotope production reactor at the Pelindaba site, some thirty kilometres west of Pretoria. The reactor is an Oak Ridge Swimming Pool Type design presently rated at 20

EXECUTIVE OVERVIEW

Megawatts (thermal). The reactor has been in operation for some thirty-five years and is presently used mainly for the production of radioisotopes for medical and industrial purposes, for the treatment of semiconductor material, and for research and training. NECSA also engages in a number of nuclear technology related development projects and provides a number of related services to industry.

In the past few years, increasing effort has been expended by the regulator on a new Pebble Bed Modular Reactor demonstration module which is being developed by Eskom. The designers propose to make use of existing high temperature gas cooled reactor technology utilising coated fuel particles fabricated into spherical fuel elements or pebbles. This reactor design has been combined with a gas turbine.

These various activities give rise to the generation of a range of radioactive wastes which have to be managed safely. The mining and processing of radioactive ores generates very large volumes of radioactive waste in the form of radioactive mine dumps and waste rock piles. They also emit a range of other operational radioactive wastes, some of a more concentrated nature. Large quantities of contaminated scrap materials are also generated by these industries, the re-cycling of which has to be carefully controlled. A number of off-mine sites have also been contaminated owing to poor waste management practices in the past. Efforts have been underway for some years to rehabilitate the sites but limited progress has been made to date. Operational wastes from Koeberg fall into the categories of low, medium and high level waste. The first two categories can be safely disposed of at the Vaalputs National Radioactive Waste Repository. High level waste in the form of spent nuclear fuel is presently stored in dedicated facilities at the Koeberg site. NECSA also generates radioactive waste during the conduct of its operations, which together with substantial quantities of waste from past activities, is stored at the Pelindaba site of NECSA. Spent fuel from the operation of the Safari reactor is stored in a dedicated storage facility at the Pelindaba site . Disused radiation sources and wastes from a range of medical and industrial uses of radioactive sources are also in storage at Pelindaba.

The NNR is required, by statute, to fulfil its regulatory function by establishing appropriate safety standards and standards of regulatory practice, by evaluating the adequacy of designs and operating practices, by setting necessary conditions for authorisation of the activities within its purview and by the conduct of a range of compliance assurance activities which will provide the necessary assurance that the activities are being carried out in accordance with the conditions laid down and that these conditions are achieving the required level of safety.

The regulatory control process must consider both normal operations and potential accident situations. It must also consider present operational aspects as well as exposure of future generations that may arise from activities currently being undertaken, particularly those associated with the management of radioactive waste. This process has to be carried out under a defined legal regime and must be free from any potential conflict of interest which may arise due to the development, operation or promotion of any of the activities being regulated. There must also be sufficient ongoing dialogue with interested and affected parties to demonstrate that the control over potential nuclear and radiological risk is being effectively exercised and that the safety of the workers and public is guaranteed.

This report serves to describe the activities undertaken in the past year by the NNR and its forerunner, the Council for Nuclear Safety. It also provides an indication of the level of safety achieved in the activities under its regulatory control. It reports on aspects of nuclear safety (prevention of major nuclear accidents), radiation protection (the routine day to day protection of workers and members of the public who may be exposed to radiation as a result of their occupation or from the operation of the regulated activities. The management of radioactive waste and the transport of radioactive material.

The NNR is a listed Public Entity in terms of the Public Finances Management Act (PFMA) and, as with its forerunner, the Council for Nuclear Safety, it is obliged to set clear performance objectives and to systematically report on their fulfilment. In terms of reporting requirements under the National Nuclear Regulator Act and in fulfilment of the reporting requirements of the PFMA, this report is presented in two sections. The first section provides an executive overview of the past year's activities and the second section reports on the detailed fulfilment of the discrete objectives set down.

EXECUTIVE SUMMARY

Legal and Management

The nuclear regulatory process is conducted in terms of dedicated legislation. During the course of the past year, new legislation was promulgated, the National Nuclear Regulator Act, which replaced the Nuclear Energy Act 1993. The previous Act established and provided for the Atomic Energy Corporation and the Council for Nuclear Safety. Concerns had been raised in 1995, following the political transformation within the country, about the activities of these two organisations being addressed by the same legislation. Criticisms were raised that the promotion and regulation of nuclear and radiation related technologies should be independent. As a result, a process was commenced to amend the legislation accordingly.

The legislation was developed by the Department of Minerals and Energy in consultation with various stakeholders including CNS. Following promulgation of the legislation, a steering committee was formed between the NNR and the Department of Minerals and Energy aimed at ensuring a smooth transition to the new legislation. The main issues dealt with were the status of existing licences, the identification of regulatory and safety standards and the continuity of licence fees. Arrangements were also put in place to appoint board members for the NNR. The Board now has representation from business, labour, affected communities, the Department of Minerals and Energy and the Department of Environmental Affairs and Tourism together with independent members.

In the broader context of government policy, in its capacity as an advisor to government, the CNS provided input into policy development processes, particularly the National Integrated Energy Planning process, and regarding the development of the PBMR project. With respect to both issues the CNS representation has the purpose of advising on safety related issues and is not aimed at promoting any particular energy option. The lack of a National Radioactive Waste Management Policy remains one of CNS major concerns.

Regarding internal management, the CNS continued to refine and develop its systematic approach to management. At the start of the year, defined objectives were laid down to satisfy the requirements of the Reporting by Public Entities Act (forerunner of the Public Finances Management Act) and to provide an internal management control mechanism. The objectives included those to be undertaken as part of the routine conducting of the regulatory process, together with a number of specific development objectives. An overall management directive is in place, providing the framework for conducting the activities of the CNS, and departmental management manuals complement the overall directive.

It is internationally recognised that national nuclear regulatory authorities should seek outside independent peer review of their activities. To this end, the International Atomic Energy Agency (IAEA) provides a service to its Member States which arranges and conducts such reviews by international teams of experts. The CNS has made a request to the IAEA for such a review in South Africa and it is anticipated that it will take place during the first half of 2001.

The council met five times during the year and exercised its overview function on the activities of the CNS. During the course of the year, the Council observed the annual Koeberg emergency exercise and undertook a visit to the Vaalputs Waste Repository where it also met with representatives of the local community. A workshop took place between the Chamber of Mines and a number of Council members to consider safety standards for radiation hazards in the mining industry. Meetings were held during the year on the establishment of an advisory committee on radiation safety matters. It had been felt that such an advisory committee could provide valuable input to the Council from interested and affected parties such as licensees, unions, affected communities, professional societies and public interest groups. In view of the decision to broaden representation on the board of the NNR, this initiative was discontinued.

Supporting Activities

A range of supporting activities was undertaken during the reporting period involving liaison with a number of government organisations and interested and affected parties. The activities also involved interaction with nuclear regulatory authorities in a number of other countries and with the international organisations involved in nuclear, radiation, waste and transport safety. The CNS was also involved in capacity building initiatives.

Contact was maintained with the Department of Water Affairs and Forestry regarding control over radioactive contamination within water bodies. Specific consideration was given to the high levels of naturally occurring



The CNS was involved in capacity building initiatives.

radionuclides in water in areas of the Northern Cape. Discussions were undertaken with the Department of Environmental Affairs and Tourism, particularly on how the public involvement in the Environmental Impact Assessment process and the nuclear licensing process could be combined for projects such as the PBMR and any significant upgrading of nuclear facilities. Co-operation has been maintained with the Department of Minerals and Energy in respect of mine rehabilitation where radioactive wastes are present.

The development of forums for liaison and dialogue with workers and members of the public around licensed facilities has continued. Such forums are well developed for the Koeberg site and meetings have taken place with public representatives from around the Vaalputs National Radioactive Waste Repository and the Pelindaba site of the erstwhile Atomic Energy Corporation. A number of meetings have taken place with labour representatives from the mining and minerals processing industries.

Of major significance on the international front was the presentation of the South African country report to the first meeting of contracting parties to the International Convention on Nuclear Safety. The Convention commits member countries to maintain nuclear safety and regulatory control at levels comparable to international standards. Countries are also required to periodically report on how they are maintaining such standards and to submit the report for international peer review. The South African report received extremely favourable comment overall with minimal adverse comment.

A sister convention to the Convention on Nuclear Safety, the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management was agreed in 1997. It has been indicated by the Minister that South Africa will sign and ratify the convention.

The Council for Nuclear Safety has exchange agreements with a number of nuclear regulatory authorities in different countries and maintained an active involvement with these authorities. Close involvement was also maintained with the international nuclear, radiation, waste and transport safety standards development process. A number of international conferences were also attended by staff members.

The CNS has recognised the need for national capacity building in the disciplines of nuclear, radiation, radioactive waste and transport safety. To this end, sponsorship has been provided and staff members have lectured and given organisational support to both the Masters course at the University of the North West in radiation science and technology and the post-graduate course in radiation safety presented by the University of the Witwatersrand in collaboration with the International Atomic Energy Agency.

Safety Standards and Development

Safety standards have been developed for the Pebble Bed Modular Reactor (PBMR) project. The standards have taken the fundamental safety standards and developed them for application to the project. In addition, the licensing process that will be required to demonstrate compliance with the fundamental safety criteria has been set down in the licensing requirements. When licensing the Koeberg project, emphasis was placed on probabilistic safety assessment because the design was well established and based on internationally recognised general design criteria. For the PBMR project, more emphasis is being placed on demonstrating the adoption of good nuclear safety engineering principles in addition to both deterministic and probabilistic safety assessment.

In view of the review of emergency planning arrangement for Koeberg, efforts have been expended on reviewing the standards for emergency planning. The work entailed consideration of reference accidents and meteorology. A new standard on emergency planning and preparedness has been drafted on the basis of developing international emergency planning standards. Work has also been undertaken on waste management standards for decommissioning, mining and minerals processing and software quality assurance.

A number of regulatory tools have been under develop-

ment throughout the financial year. Considerable progress has been made in developing root cause analysis methodology and work has commenced on the development of safety indicators for the various licences and for aspects of nuclear, radiation, waste and transport safety. A first draft of a standard on exemption and risk/hazard based licence conditions has been prepared. A database has been developed and made available to all staff members on the feedback of international experience in nuclear, radiation, waste and transport safety.

Licensing Projects

Koeberg

The periodic safety review of Koeberg which had been commenced in 1995 was finalised during the reporting period. The review was a major undertaking and compared Koeberg against current international nuclear safety standards. A number of areas were identified where safety improvements could be made, but the overall conclusion of the review was that no major safety concerns exist and continued operation of Koeberg was justified. A programme of work has been developed in order to systematically address the various areas identified for safety improvement. As part of the review processes, emergency planning arrangements were subject to an independent review which made use of international consultants. Areas for improvement, relating mainly to off-site planning, were identified for improvement and a programme has been put in place to address these areas.



Koeberg Nuclear Power Station

The work on revisiting the planning basis progressed significantly and the need was identified to ensure careful control of population and infrastructure developments around Koeberg. Mechanisms are in place to collaborate with the various local and provincial authorities to ensure the effectiveness of such controls.

A number of major projects have been underway at Koeberg throughout year. These include extending the spent fuel storage capacity. This extension will enable the spent fuel that will be generated during the remaining design life of the power station to be safely stored in the spent fuel storage building. The safety case and supporting analyses for this project were under review and the issues of concern that arose are being adequately addressed. Approval is envisaged in the forthcoming financial year. Eskom has decided to make use of a new advanced fuel design and the related safety assessment work has been carried out on the new design. Development has been undertaken on safety assessment methodology to ensure focus and effectiveness. Operator training and operating procedures have also been reviewed and improved.

The routine testing and inspection programmes have been undertaken on equipment, components and material important to safety. No major flaws or shortcomings were identified.

Occupational radiation exposure of workers was maintained within dose limits. The highest individual exposure recorded was 20,4 mSv and the collective exposure of the workforce was 1,75 person-sievert which, averaged over the workforce of some 1 756 persons, was 0,98 mSv. These levels compare very favourably with previous years and with international experience.

Public exposure from effluent discharges was maintained at a very low level. Calculated doses were less than 0,001 mSv. Control over effluent discharge was maintained well within authorised limits and this was confirmed by monitoring of the local environment.

Radioactive wastes generated at Koeberg were processed and packaged for disposal at the Vaalputs National Radioactive Waste Repository. All packages complied with the waste acceptance criteria and no incidents or accidents occurred in the transport of waste to the site.

No occurrence of serious safety significance was experienced during the year. One occurrence involved overfilling the reactor cavity pit with water and this gave rise to

some media attention. The occurrence was not of major safety significance in view of the fact that the reactor fuel had been unloaded from the reactor at the time of the occurrence.

Investigation of possible Y2K problems that could arise was carried out throughout 1999 and all potential problem areas were addressed. Increased surveillance was maintained during the changeover period but no issues arose.

Pebble Bed Modular Reactor

A considerable amount of interaction took place with Eskom over the structure of the safety case for the PBMR and on the supporting analysis that would be required to substantiate the safety case. The need to present an integrated safety submission to demonstrate how the general design criteria would cater for all normal operating circumstances and potential accident situations was emphasised. Similarly, the manner in which specific design rules would need to demonstrate that they satisfied the general design criteria, would have to be presented. Aspects of the deterministic and probabilistic analyses that would be required to demonstrate compliance with the fundamental safety criteria set down in the licensing requirements were also addressed. Consideration was given to the structure and content of the safety analysis report in which these various elements would be presented.

A number of preliminary documents were submitted to the CNS setting out the concept design and methodologies to be used in the overall safety assessment. Guidelines for CNS review of the licensing submissions that will be submitted, have been under development. A number of specific areas have been considered on a generic basis, including aspects of core neutronics and vessel embrittlement.

Discussions have taken place with representatives of the Department of Environmental Affairs and Tourism (DEAT) regarding the process to be adopted for public consultation and input. In terms of the Environmental Impact Assessment (EIA) process and the National Nuclear Regulator Act, opportunity is provided for public comment. The discussions have been aimed at combining the two processes such that consideration can be given to both the nuclear safety aspects and other possible environmental impacts. The CNS will deal with aspects of nuclear, radiation and waste safety and the DEAT with other environmental issues.



Council members with members of the local farming community

Radioactive Waste Management

The Vaalputs National Radioactive Waste Repository was operated successfully throughout the year. Radiation exposures to the workforce were maintained well below limits and no public exposure occurred. Following the incident in 1997 when small amounts of contamination were found to have migrated through some of the concrete containers in the disposal trenches, an international peer review was requested, and was conducted by the IAEA. No major shortcomings were identified. However a number of recommendations were proposed to improve operational management. Implementation of the recommendations was monitored.

A review was carried out of waste acceptance criteria employed by the AEC. These were compared with criteria used for similar wastes in other countries. A number of areas for improvement were identified and have been taken up with the AEC.

The situation regarding contaminated sites from various recycling and refurbishing activities associated with the mining and minerals processing industries remains largely unresolved. Whilst the mining industry has undertaken to make funding available to provide for cleanup activities, the undertaking is contingent on a waste disposal option being available. The absence of a national radioactive waste management policy has delayed the identification of a suitable option.

Atomic Energy Corporation – Pelindaba Site

The process of retrospective safety assessment of all the facilities on the Pelindaba site is almost complete. Consideration was given during the year to the safety assessment for upgrading the Safari reactor from twenty to

thirty Megawatts (thermal). The hazard, presented by various chemical processing operations on the site in terms of potential impact on the nuclear facilities, was reviewed and found to be acceptable. Following the criticality accident at the Tokaimura facility in Japan in October 1999, a review was undertaken to ensure that a similar accident could not take place at Pelindaba. The review found that arrangements were satisfactory for the safe operation of the facilities reviewed.

The compliance assurance programme was reviewed for adequacy and a number of revisions were made to ensure that the programme was totally comprehensive. In excess of one hundred and forty inspections took place on the site during the year, none of which revealed any major shortcomings.

A number of minor occurrences were reported during the year. A veld fire occurred in the vicinity of the Thabana waste storage facility but no radiation hazards were experienced.

Radiation doses to workers on the site were maintained well below limits. The highest individual dose experienced was 23.28mSv and the average was 0.503mSv. Doses to members of the public arising from effluent discharges to the environment were maintained well within limits, being calculated to be less than 95.14mSv to the critical group. Emergency planning arrangements were tested and found to be in order. Arrangements for possible Y2K problems were put in place including review and assessment of potential effects. No problems arose during the changeover period.

A considerable amount of radioactive waste is in storage on the Pelindaba site. The waste was generated over the past forty years and stored in a manner which, whilst not posing any undue hazard to the workers or members of the public, requires a longer-term solution.

Mining and Minerals Processing

The full range of activities associated with mining and minerals processing is now required to be regulated. The activities involving lesser concentrations were scheduled, by government notice, to be progressively considered. A report has been compiled on the radiation hazards presented by the activities concerned and discussions are underway with the parties responsible for application of the regulatory process.

Significant progress has been achieved with the assessment of public exposure owing to mining and minerals processing activities. The majority of licensees have now completed their assessments and the remainder will be completed by mid-2000. On the basis of these assessments, control and monitoring programmes are being established and will be scheduled for completion during the next financial year.

Exposure of the underground workforce to radiation is decreasing but still remains at unacceptably high levels.

Ninety nine percent of underground working areas have now been assessed for radiation levels and control and monitoring programmes are being put in place which will come into force during 2000.

Waste management programmes have been submitted by licensees and are being evaluated. Higher level concentrations of long lived wastes are presently being placed in storage, and procedures are being scrutinised to ensure proper segregation and characterisation of these wastes together with their safe storage. A suitable disposal option remains to be determined for these wastes. Progress hampered by the lack of a national radioactive waste management policy. The bulk residues, in the form of slimes dumps and waste rock piles, present a long term radiation hazard and the effectiveness of stabilisation mechanisms and long term institutional control over these wastes remains to be demonstrated.

Administration and Control

The effectiveness of nuclear regulatory control is dependent primarily on the availability of adequate resources and a competent workforce. At the end of the financial year, the staff complement stood at seventy-nine. Good progress was made with implementation of the affirmative action policy with forty six percent of all staff members and thirty three percent of the management staff being from the designated group. A formalised human resource development programme was finalised and put into place which identifies the individual training and development needs of each staff member and makes provision for the optimal utilisation of resources in providing such training and development.

The IT systems employed by the CNS were reviewed for Y2K compliance and potential problems that were identified were addressed. No problems arose. The adequacy of the IT systems to store and manipulate the large amount of data and information received and processed by the CNS were subject to ongoing review and improvement.

Improvements were made to the bookkeeping system to provide a better departmental-based cost control sys-

tem enabling ongoing monitoring and review of costs associated with the various licensing and related projects. An improved internal auditing system was developed and implemented and effective control was maintained over the financial affairs of the organisation.

DETAILED NNR REPORT ON THE ACTIVITIES OF THE ERSTWHILE CNS DURING THE PERIOD 1 APRIL 1999 – 23 FEBRUARY 2000

A. LEGAL AND MANAGEMENT

A.1 National policies

A.1.1 To provide the necessary input into the establishment of a national radioactive waste management policy.

The responsibility for developing a national radioactive waste management policy was taken over by the Department of Minerals and Energy. It is understood that the Department will engage the services of consultants to undertake the process of developing the policy during the first half of 2000. The CNS has offered to provide assistance to the Department in terms of making personnel available. The CNS has stressed the importance of developing the policy as soon as possible.

The CNS has established an internal radioactive waste Steering Committee (RADWASTE) whose main function will be to co-ordinate radioactive waste issues in the CNS. This will include the co-ordination of input into the above policy development process.

A.1.2 To monitor and provide input as necessary into national policy in respect of energy issues, in particular safety implications related to restructuring of the generator.

A representative and alternate have been nominated to the steering committee for the Integrated Energy Planning process that was commenced by the Department of Minerals and Energy in January 2000. The steering committee has met and agreed on proposals for the establishment of a modelling process that will identify options and an optimised selection process. Subsidiary working groups to support this process have been identified and will be established as and when necessary. The process is scheduled for completion towards the end of 2000.

A.1.3 To provide input as required into national policy in respect of safety aspects of new nuclear technologies, especially the PBMR.

Input was provided to the technical and economic feasibility studies carried out by the International Atomic Energy Agency (IAEA) on the PBMR at the request of the Minister of Minerals and Energy. In addition, the CNS was involved with discussions on the proposed Environment Impact Assessment (EIA) process. A cabinet memorandum is being compiled which will take into consideration the report from the IAEA on technical and economic feasibility. The IAEA safety review took place in February 2000 to which the CNS made input. The conclusions from that review will be featured in later considerations of the project by the NNR.

A.2 Legislation

A.2.1 To provide input to assist in the promulgation of sound legislation.

Input was provided into the process of developing the National Nuclear Regulator Act. Following promulgation of the legislation, a steering committee was established with the Department of Minerals and Energy to facilitate transition to the new legislation. It was agreed that existing licenses would remain in force. A holder of a nuclear licence which considers that it may be a candidate for a certificate of registration can make application for registration. The arrangements for licence fees would remain in place. The safety standards encapsulated in conditions of licence would be deemed to form the basis for regulatory authorisation pending adoption of the new standards.

A.2.2 To review management manuals for consistency and adequacy.

The CNS subjected management manuals to an internal review process to ensure consistency throughout the organisation.

A.2.3 To arrange a process of international peer review of the organisation and operation of the Council for Nuclear Safety.

A formal request has been submitted to the International Atomic Energy Agency (IAEA) for an international peer review to be conducted on the CNS. It is anticipated that the review will be scheduled by the IAEA for late 2000 or early 2001. The IAEA provide such a service to Member States in the form of an International Regulatory Review Team (IRRT).

A.3 Council Affairs

A.3.1 Council for Nuclear Safety

A.3.1.1 To establish and implement a formal capacity building programme as necessary.

A programme was agreed with the Council for Nuclear Safety for presentations to be made on all aspects of the work undertaken by the CNS and to visit a representative number of licensees in order to familiarise Council members with the technology and operations involved. The programme was commenced and was to run over a period of one to two years. It will have to be superseded when the new board takes office.

A.3.1.2 To establish and implement a structured programme of work.

A systematic work programme for the Council was established with a view to the Council fulfilling all its statutory functions. This will have to be superseded by a programme to be agreed by the new board of the NNR.

A.3.2 Advisory Bodies

A.3.2.1 To finalise arrangements and assist in initiating the work of the Advisory Committee on Radiation Safety (ACORS).

The Minister was informed about the purpose of ACORS. Preliminary arrangements were made for its establishment, meetings of interested parties were convened and a constitution agreed. It was, however, superseded by the adoption of the NNR Act which provides for representation on the board of directors including business, affected communities, labour and the Departments of Minerals and Energy and Environmental Affairs and Tourism. In view of these parties being represented on the board of the regulator, the need for an advisory body representing interested and affected parties is no longer necessary.

A.4 Management Affairs

A.4.1 Reporting by Public Entities Act

A.4.1.1 To monitor compliance with CNS approved objectives and report as required by the Act.

A set of objectives was formulated and presented to the May 1999 meeting of the Council for approval. Following acceptance by the Council, progress on meeting the objectives was reviewed periodically throughout the year.

A.5 Supporting Activities

A.5.1 External liaison

A.5.1.1 To establish contact with licensing authorities overseas dealing with regulatory control over radiation hazards in the mining and processing of radioactive ores and minerals.

Contact was made with regulatory authorities regulating various mining and minerals processing activities from Australia, Brazil and a number of European countries at various technical meetings and conferences. One of the outcomes is the formation of The Southern Hemisphere Forum. This has been established to discuss matters related to radiation protection in the mining and processing of radioactive minerals and ores and is planning a workshop for the coming year. This will enhance further contact in this regard.

A.5.1.2 To develop contact with research reactor safety work currently being undertaken internationally.

A visit was made to the Swedish national nuclear regulatory authority, which is responsible for licensing, amongst others, the Studsvik research reactor which is of a similar age and design to the SAFARI reactor. One of the recommendations under consideration is the implementation of a safety envelope licensing strategy for the SAFARI reactor. Due to experience gathered in safe operation, the SAFARI reactor is at least one facility OF the AEC that is ready for a safety envelope licensing strategy. This strategy allows a facility to operate within a safety margin within which minor changes can be made and the CNS informed of the changes prior to implementation. This would minimise CNS involvement in the approval of changes that have no significant impact on the safety of the facility.

A.5.1.3 To further develop liaison with institutions engaged in waste safety work of particular relevance to current projects.

Contact has been established with a number of members of the International Atomic Energy Agency Waste Safety Standards Advisory Committee. This committee has representatives from sixteen countries including South Africa and is charged with overseeing the development of international standards for the safe management of radioactive waste. To this end waste acceptance criteria for a near surface repository have been requested from the representative of Sweden, who agreed to forward them to the CNS. These will be used for comparison with the Vaalputs waste acceptance criteria.

A.5.1.4 To continue with the implementation of the guideline for co-operation with DWAF.

The CNS and DWAF have maintained a healthy working relationship with regular meetings to discuss areas of

A. LEGAL AND MANAGEMENT

common interest in terms of the standing agreement for co-operation. Considerations have been given to the high levels of natural radioactivity in water in the Northern Cape. It was confirmed that the CNS and DWAF would continue to co-operate on this matter. The way in which this difficult and politically sensitive matter was going to be addressed was also agreed.

A.5.1.5 To develop and implement Guidelines for Co-operation with the Mine Health and Safety Inspectorate.

Limited progress has been made in this regard. The CNS/DWAF agreement has been proposed by the CNS as a basis for future co-operation. Further discussions in this regard will be linked to the implementation of co-operative governance procedures in the National Nuclear Regulator Act.

A.5.1.6 To develop and implement Guidelines for Co-operation with the Department of Environmental Affairs and Tourism (DEAT).

Several meetings have taken place between the CNS and DEAT, related mainly to the Environmental Impact Assessment (EIA) for the proposed PBMR project as required by the Environment Conservation Act. This Act, together with the licensing process, calls for public consultation. The CNS and DEAT have engaged in discussions to determine a single public consultative process which will satisfy both the licensing and EIA requirements. In terms of this parallel process, the CNS will address nuclear safety, radiation protection, radioactive waste management and nuclear emergency planning aspects while the conventional environmental impact aspects will be considered by DEAT. The arrangements for this single public consultative process will be finalised during 2000 following a decision by government to continue with the project.

During the meetings it was also agreed that a general agreement for co-operation between the two organisations was necessary and should be formulated. The agreement already in place with DWAF was provided to DEAT as a proposed model for such an agreement. The co-operation agreement with DEAT will be finalised by mid-2000.

A.5.1.7 To maintain liaison and, where necessary, establish more formal agreements with other relevant government departments regarding co-operative governance, e.g. Health, Labour.

Limited progress has been made in this regard in view of the ongoing deliberations concerning the CNS legislation. The newly promulgated legislation requires the CNS to establish co-operative governance agreements with other authorities involved in the regulatory control over radiation hazards. The matter will be pursued further pending promulgation of the legislation and clarification of the obligations that arise.

A.5.1.8 To develop an environmental management plan with DEAT.

Preliminary discussions have been undertaken with DEAT. However the obligations on the CNS have not been fully clarified and these will be pursued pending promulgation of the CNS legislation.

A.5.1.9 To establish licensee liaison groups – workers and public for all licensees.

A number of meetings have been held at regular intervals throughout the year with the various representatives of organised labour from Koeberg Nuclear Power Station (KNPS). Regular liaison meetings have also taken place with the local authorities around Koeberg. These include, in particular, the Emergency Planning Liaison Committee and the Koeberg Environs Development Committee (KEDC). At these meetings, topics mainly related to nuclear safety at Koeberg, emergency planning and population development around the power station have been discussed.

The CNS has made representations in the Pelindaba Communication Forum, a group representing interested and affected parties from within the local community around the Pelindaba site. Contact has been made with representatives of organised labour with a view to the establishment of a more formalised liaison mechanism.

Ad hoc meetings have taken place with representatives of organised labour, particularly those associated with mine licensees where high levels of radiation exposure are being received by workers and where annual dose limits are being exceeded. These meetings have led to the development of proposals for regular meetings with representatives at all licensed mining and minerals processing facilities. Limited progress has been made with establishing formal liaison with representative of the public around these sites. This is largely due to the large numbers of sites concerned (in the region of seventy). A mechanism will be established within the forthcoming year.

A.5.1.10 To pursue the schools project with a view to repeating a similar project as undertaken in

1998 but, if possible, with broader participation.

This project was not pursued owing to experience gained from the project undertaken in the previous year. Better liaison needs to be established with the high school science teaching fraternity. Efforts were expended to establish such liaison and the project will be undertaken again in the forthcoming year.

A.5.1.11 To conduct a series of capacity building workshops in nuclear, radiation and waste related safety matters as agreed with stakeholders.

A meeting took place between staff members of the CNS, Council members and public interest groups in the Northern Cape concerned with the Vaalputs National Radioactive Waste Repository. It was agreed with the representatives that a more extensive and structured capacity building workshop for these groups would be arranged in the first half of 2000. Arrangements are underway for the workshop.

A group of safety representatives from the National Union of Mineworkers at the Harmony Mine visited the CNS for a two-day workshop during the first quarter of 2000.

A.5.1.12 To further develop public awareness

A booklet was produced which provided answers to questions of workers who are occupationally exposed to radiation. The booklet was produced in consultation with representatives of organised labour and is aimed primarily at workers who are exposed to radiation within the mining and minerals processing industries. Nevertheless it is also of interest to workers in other facilities and members of the public.

A.5.1.13 To publish a periodic newsletter on the affairs of the CNS.

The first external newsletter is planned for the end of the first quarter of 2000.

A.5.1.14 To produce the Annual Report.

The annual report was produced and presented to Parliament and became available for public distribution during the first quarter of 2000.

A.5.1.15 To further develop and maintain a web page on CNS activities.

Work has been undertaken on the design of a web page. However it was recognised that considerable changes would have to be made following promulgation of the NNR Act. It was therefore deemed appropriate to delay the launching of the web page until after the legislation was promulgated and a new board appointed. It is envisaged that the web page will be launched during the first half of 2000.

A.5.2 International Conventions

The CNS was represented at a symposium on "Reform of Civil Nuclear Liability" in Budapest during June 1999. The symposium addressed the recent amendments to the nuclear liability conventions, namely the Vienna Convention and the Convention on Supplementary Compensation for Nuclear Damage. This highlighted aspects to be addressed in our legislation as well as indicators for South Africa becoming a signatory to the conventions.

A.5.2.1 To encourage and promote signature and ratification of the waste convention.

Discussions have taken place with representatives of the Department of Minerals and Energy where the benefits of signing and ratifying the convention have been emphasised. Indications are that consideration will be given to signing the convention following establishment of the national radioactive waste management policy. Discussions were held with representatives of the Department of Environmental Affairs and Tourism, Department of Foreign Affairs, Eskom and the AEC who deem it to be in the national interest to sign and ratify the convention. Further representations will be made to the Department of Minerals and Energy.

A.5.2.2 To establish a "trial run" on compiling a country report in respect of the waste convention to test compliance with its obligations.

A preparatory meeting for implementation of the waste convention took place in October 1999 at which the CNS was represented. Draft guidelines for national reports were compiled and finalised at this meeting. These will form the basis for compilation of a trial country report. The absence of a National Waste Management Policy would be a deficiency in such a report.

A.5.2.3 To present the country position on the Convention on Nuclear Safety at the international review meeting.

The South African national report was presented at the review meeting of contracting parties to the convention and responses to written questions received by South Africa will be placed on the web-site. The report received favourable comment and was subject to minimal criticism in the international peer review process.

A.5.3 International participation.

Throughout the year the CNS was involved in a number

of international meetings. These were related to the development of safety standards, liaison with overseas regulatory authorities, information exchange conferences and seminars, scientific visits and project related visits.

A.5.3.1 To optimise the strategy for maintaining involvement with international nuclear, radiation and waste safety matters.

A process has been put in place to identify all relevant international meetings and activities related to nuclear, radiation and waste safety. Involvement with such meetings and activities will be proposed on the basis of servicing national obligations with regard to conventions, undertaking project related activities, maintaining involvement with the international standards development programmes, maintaining liaison with overseas nuclear regulatory authorities, maintaining awareness of technological developments and staff training.

A.5.3.2 To review participation in international research initiatives.

Consideration will be given at the end of the review period to the cost effectiveness of continued involvement in USNRC sponsored research activities.

A.5.3.3 To maintain liaison with overseas national nuclear regulatory authorities.

A number of CNS staff maintained contact with, and visited the regulatory authorities of France, Belgium, the USA, and the UK.

The CNS is planning an inaugural meeting of regulatory authorities responsible for Framatome designed reactors. The meeting is scheduled to take place in South Africa in May 2000 and the regulatory authorities from France, Belgium, South Korea and China will attend the meeting. Initial planning has been undertaken for the meeting.

The first meeting of the newly established Network of Regulatory Authorities from countries with small programmes was convened in Argentina in October 1999. South Africa is a founder member together with Argentina, the Czech Republic, Hungary, the Netherlands, Switzerland, Slovakia, Slovenia, Belgium and Finland, and was represented at the inaugural meeting.

A.5.4 Transport of Radioactive Materials

A.5.4.1 To review the obligations of the CNS in its capacity as the national competent authority in respect of the IAEA Transport Regulations.

The CNS participated in a Research Co-ordination Meeting of the International Atomic Energy Agency (IAEA) Programme on Development of a Radiological Basis for Transport Safety Requirements for Low Specific Activity (LSA) Materials and Surface Contaminated Objects (SCO) Transport.

The South African proposal to participate in the IAEA's Co-ordinated Research Programme framework to develop a dose-based approach for establishing LSA/SCO transport requirements has been accepted. Richards Bay Minerals and Namakwa Sands will conduct the project work, the aim of which is to determine the radiation exposure received by workers and members of the public from the transportation of bulk quantities of zircon sands. The next technical committee of participants is scheduled to take place in South Africa in February 2001.

The CNS was represented at a meeting of the IAEA Transport Safety Advisory Committee (TRANSSAC) to consider ways to simplify the regulations for the safe transport of radioactive material.

A.5.4.2 To assist the DOH and SAPS to investigate the extent of illicit trafficking of radioactive materials within the country and determine a course of action to be taken in co-operation with the DOH and the SAPS.

Since there are considerable illicit trafficking of radioactively contaminated scrap, an information document is being prepared for the scrap industry. A workshop will be held with the industry when this document is finalised and when the scrap industry established its planned committee on hazards associated with the industry. Meetings have been planned with DOH and the SAPS to address the above issue.

A.5.5 National capacity building.

A.5.5.1 To continue provision of assistance to the MARST course at the University of the North West.

The CNS has continued with its involvement with the MSc course in applied radiation science and technology at the University of the North West through the provision of supporting funds, lecturing assistance and representation on the steering committee.

A.5.5.2 To continue provision of assistance to the International Atomic Energy Agency sponsored postgraduate course in radiation safety at the University of the Witwatersrand.

The course for 1999 was successfully presented. Arrangements have commenced for presentation of the

course in 2000 and discussions were scheduled with the IAEA to ensure that the ongoing level of funding and commitment from them is maintained.

B. SAFETY STANDARDS AND DEVELOPMENT

B.1 Safety Standards.

B.1.1 To review the Safety Standards Programme, revise it as necessary, and to obtain formal approval from the Council.

A formalised programme of standards development was initiated in August 1999 which involved the preparation of a status table of standards documents covering the areas of nuclear safety, radiation protection, radioactive waste management and the transport of radioactive material. A formalised mechanism was established for standards review and development within the CNS and the process was put into place. The work is continuing and will have to be taken up by the new board of the NNR and pursued in terms of the obligations that arise in respect of standards from the NNR Act.

B.1.2 To review the fundamental safety standards for adequacy and compatibility with international norms.

Progress on this objective is contingent on the standards development programme as detailed in B.1.1.

B.1.3 To review the basis for emergency planning and preparedness standards and revise them as necessary with a view to ensuring adequacy and compatibility with international norms.

Work on the establishment of a technical basis for emergency planning has been underway for some time using Koeberg as a model. During this period several technical meetings and workshops were held between Eskom and the CNS in order to discuss fundamental issues, particularly related to the selection of reference accidents and meteorology conditions. The analytical techniques and underlying assumptions are also undergoing review. This work is nearing completion and should be finalised within the first quarter of 2000 (also refer to C.1.1.3 below).

The CNS has drafted a standard (LG-1036) on "Emergency Preparedness and Response Requirements for Nuclear Installations". This standard establishes the minimum requirements for nuclear and radiological emergency preparedness and response at nuclear installations, and embodies the principles of relevant IAEA guidelines and international norms and practices for emergency preparedness and response. The draft was provided to licensees for comment and will be finalised by the first quarter of 2000.

B.1.4 To document formally the nuclear, radiation and waste safety standards and the regulatory practice adopted for the PBMR project and to make them available for broad review and comment from interested and affected parties.

The CNS has formally issued Licensing Guide LG-1037 "Basic Licensing Requirements for the Pebble Bed Modular Reactor (PBMR)". The document sets down the fundamental safety requirements, expands upon the detail of the requirements and provides specific licensing criteria for the PBMR. It also specifies the processes which the licensee must undertake to demonstrate compliance with the requirements.

Guidance has also been drafted describing the information to be submitted to the CNS in support of the PBMR licence application. This draft has been sent to Eskom for comment and is to be finalised within the first half of 2000.

B.1.5 To formalise and subject to review and approval, waste management standards concerning decommissioning and demolition.

The waste management standards will form part of the general standards programme and will be developed during the forthcoming year.

B.1.6 To review and revise as necessary the programme of safety standards development applicable to the mining and processing of radioactive ores and minerals.

The required standards have been identified and a schedule has been drawn up for their development. Priority has been given to aspects that were addressed at the meeting with the Chamber of Mines, which took place in July 1999. Work on the standards will take place during the next financial year.

B.1.7 To develop a guideline on Software Quality Assurance.

The CNS draft Licensing Guide, LG-1038, "Requirements for licensing submissions involving computer codes and evaluation models for safety calculations" has been completed. The document has been provided to Eskom and the AEC for review and comment. The document is scheduled to be to be finalised by mid-2000.

B.1.8 To develop a licence document on Quality

C. LICENSING PROJECTS

Management Requirements for the Pebble Bed Modular Reactor.

The CNS Licence Document, LD-1094, "Quality Management Requirements for the Pebble Bed Modular Reactor" has been issued.

B.2 Regulatory Tools.

B.2.1 To formalise and implement a standardised approach to root cause analysis within the CNS.

Work is ongoing in this area and it is anticipated to hold an IAEA sponsored root cause analysis workshop in South Africa during 2000, following which the approach to be adopted will be finalised.

B.2.2 To develop a methodology for determination of safety indicators and adopt its use throughout the CNS.

A position paper has been drawn up and will be presented to management for further development.

B.2.3 To review, revise and formalise CNS policy on exemption and the determination of hazard or risk based licence conditions.

A first draft of the standard has been prepared. International developments are being monitored as this area is presently under review in a number of countries and organisations. It is necessary to ensure that the standards adopted are compatible with international norms in view of the implications for trade and the cross-border movement of materials.

B.3 Information Feedback.

B.3.1 To implement the internal CNS dissemination process.

A database of information that is generated by the CNS and other regulatory bodies relevant to the CNS work, is updated on an ongoing basis and is made available to all the CNS staff.

C. LICENSING PROJECTS

C.1 Nuclear Power Reactors.

C.1.1 Koeberg Nuclear Power Station.

C.1.1.1 Safety Assessment.

C.1.1.1.1 To finalise review of the Koeberg Safety Re-assessment (SRA) Report and document CNS findings.

Eskom completed the safety re-assessment for the Koeberg Nuclear Power Station as part of the periodic safety review process and submitted a Safety Re-assessment (SRA) report to the CNS.

Review of the report has been completed and is documented in the CNS assessment report, which includes an executive summary. This finalises the Koeberg Safety Report (KSR) project, which was started in 1995.



Mr Guy Clapisson
Senior Manager: Power Reactors

The report produced by Eskom includes a comprehensive listing of findings and recommendations. It concludes that no safety issues have been identified which require immediate corrective action. However, some short and medium term measures are required to either justify differences identified during the comparison process of Koeberg to the selected international safety reference case or to resolve some of the issues identified. These measures, including modification proposals, have been classified according to their safety significance, which are either medium or low priority, no high priority issues being identified.

The CNS generally agreed with the conclusions and recommendations of the report. There are, however, a number of topics on which the CNS differs from the Eskom assessment. These require further work to be undertaken by Eskom, e.g. analyses, assessments etc. in order to justify or close out the relevant issues.

The CNS therefore concludes that, provided the identified and agreed actions are addressed within an acceptable time, the main objectives of the KSR Project have been achieved and that continued operation of the Koeberg reactors is justified.

C.1.1.1.2 To agree and finalise, with Eskom, an implementation plan of identified corrective actions for safety improvements.

The actions agreed for safety improvements, identified during the KSR project, have been included in a post-KSR action plan whose implementation has been progressed and monitored during the regular monthly Koeberg Licensing Liaison Committee (KLLC) meetings chaired

by the CNS. The timeframe for implementation of the plan is satisfactory and will extend well into 2000.

C.1.1.1.3 To finalise assessment of the international review of Koeberg emergency preparedness arrangements (SAIC findings) in order to resolve the issues of demographics around the Koeberg Nuclear Power Station.

This objective is linked to B.1.3. The SAIC report revisits the technical basis for the Koeberg Emergency Plan. The CNS is satisfied that the report, based on the reference accident chosen, indicates that the present emergency planning zone is not unacceptable. Several technical meetings and workshops were held between Eskom and the CNS in order to discuss fundamental issues regarding the EP Technical basis. The various technical issues have been resolved and the project is now on its way to completion in the very near future.

Within the planning zone it is also necessary to ensure that adequate infrastructure is in place to effectively implement the emergency plan. One of the prime factors involved is the ability to notify and if necessary evacuate people from the area within particular timeframes. In order to demonstrate the adequacy of resources and arrangements on an ongoing basis, a committee of various parties was established known as the Koeberg and Environs Development Committee (KEDC). The objective of the (KEDC) is to establish rules for developments around Koeberg based on emergency planning requirements, population projections and modelling of traffic movement anticipated during implementation of the emergency plan. The committee is chaired by the CNS and attended by Eskom, Cape Metropolitan Council, Blaauwberg and other municipalities, civil authorities and other interested and affected parties. The KEDC also serves as a forum for discussion of present developments in the vicinity of Koeberg. Bimonthly meetings of the KEDC have been held since 1996. A project has been structured to adopt the existing traffic flow model for the area in order to test the acceptability of population development scenarios to identify the resources necessary to maintain the viability of the emergency plan. This modelling will enable appropriate controls on development to be maintained.

The Cape Metropolitan Council (CMC) is conducting a project on population projections in the Cape Metropolitan Area. The project will take the population projections beyond the expected life of the plant, from the 1996 census to 2031 in five-year intervals. A process to keep the projections valid will be developed by CMC. Initial results of the population projections up to and beyond 2031 were presented at the KEDC meeting in January 2000. Spatial distributions will be developed in a later phase of the project.

C.1.1.1.4 To complete the review of licensee safety assessments in support of specific requests for licence change requests or modifications, within acceptable timeframes and service standards.

Modification Change Requests.

While the CNS assessed a large number of modifications during 1999, none were of major safety significance. A number of important modification proposals mainly related to spent fuel storage and nuclear fuel management, currently under review by the CNS, are however planned for 2000.

Spent Fuel Storage at Koeberg.

The purpose of this project is to conduct re-racking of the spent fuel storage pools at Koeberg, replacing the existing racks with higher density racks to approximately double the storage space. The present racks would result in licence conditions preventing further reactor reloads taking place for Unit 1 beyond April 2000 and for Unit 2 beyond January 2001. Re-racking on Units 1 and 2 will commence in August 2000 and March 2001 respectively.

A number of major technical issues are being addressed including criticality under certain accident conditions and under normal operation and the validation of neutron absorbing inserts. Various design and manufacturing issues are under review as is the spent fuel pool cooling capacity.

Owing to delays in the overall project implementation Eskom has had to develop a contingency plan, which involves the use of dry storage casks. Eskom presently has four casks each with a capacity of 28 fuel assemblies. These casks will provide enough storage space to allow for one additional fuel cycle on each unit. Cask loading is scheduled for March 2000 (Unit 1) and November 2000 (Unit 2). The technical safety assessment work on this project is nearing completion and no major outstanding concerns have been identified.

Spent Fuel Pool Re-Racking Auxiliary Projects.

Eskom is also proceeding with the auxiliary project to upgrade various back-ups and controls affecting spent

fuel pool operation, such that the upgraded systems would satisfy the safety prescriptions of the US Standard ANS-N57.2. The development of this standard had not been finalised at the time of original design. Assessment and evaluation of these modifications and the additions required have made significant demands on the engineering resources at both Eskom and the CNS.

Introduction of New Fuel Designs in the Koeberg Reactors.

As part of its nuclear fuel management strategy, Eskom is considering the use of US Westinghouse fuel in the Koeberg reactors. The schedule adopted by Eskom for the implementation of this programme provides for four lead use assemblies (LUAs) of the Westinghouse 374 Robust Fuel type to be loaded into Koeberg Unit 1 during outage 111 in April 2000. The technical assessment work on this project is nearing completion and no major outstanding concerns have been identified. The main difference between these fuel assemblies and the present fuel is in the number of grids holding the fuel pins. The new design has more grids per assembly which provides improved safety margins in terms of thermal hydraulic conditions and mechanical stability.

Furthermore the CNS is presently reviewing a safety case submitted by Eskom in support of a request to increase the approved fuel rod burn-up limit for certain fuel types. This should result in longer fuel cycles and therefore less frequent refuelling outages, thereby improving safety. However, the safety case will have to show that safety margins of the current safety assessment would be maintained.

Transport Containers.

The CNS approved the request from Eskom for validation of the Certificate of Approval for the Special Arrangement for the transport of the Framatome RCC-3 Transport Container. The container is designed for the transport of new fuel assemblies.

A separate application to license the MCC-3 transport containers in which the LUA's will be shipped from the USA to SA, has been provisionally refused pending demonstration that the Westinghouse containers satisfy IAEA transport requirements.

Koeberg Operators Licensing and Training

During 1998 the CNS and Eskom psychologists reported increased levels of occupational stress among the licensed reactor operators. Various reasons were suggested including the evaluation methodology utilised during the re-qualification training. The situation was reviewed by a team drawn from a number of countries (France, Spain and USA), Eskom and the CNS. It addressed the training and re-qualification training of reactor and senior reactor operators, the candidate selection process, criteria and methods and the CNS licensing requirements and philosophy in respect of operator training.

The general CNS conclusion from this review was that the current training programme met licensing requirements but some improvements and changes were identified in order to bring it in line with international practice and standards, and to account for South African demographics. It was also recognised that there could be benefit in a more performance based regulatory approach to operator training as opposed to the current more "intrusive" regulatory function. This, however, requires adequate processes to be in place, which is presently not the case. The framework of a safety case taking into account the recommendations of the international review team and the requirements to support a performance based approach has been developed by Eskom and accepted by the CNS. Eskom is currently developing the safety case which it is anticipated will be available for review within the year 2000.

Koeberg Operating Procedures Review.

As the result of a recommendation from the review of operator training, a review of the Koeberg operating procedures was also carried out. The review team also included members from overseas organisations and the recommendations have been submitted to the CNS and are presently under review. On the basis of the report, a case is being formulated to reduce the number of operating procedures contained in the licence to those necessary for safe operation.

Radiation Dose Conversion Factors.

Consideration has been given to refining the methodology used for estimation of radiation doses to members of the public arising from effluent discharges. The work is not yet finalised but it is envisaged that it will provide increased confidence in the dose estimates and upon approval by the CNS, the methodology will be included in the next revision of the Safety Analysis Report.

C.1.1.1.5 To finalise and implement the CNS licensing guide on safety cases submitted by the licensee as well as the CNS licensing guide review plan to be used by CNS assessors.

Licensing Guide on the assessment process for reactors.

A Licensing Guide on "Safety Assessments for Nuclear Power Reactor Sites and Submissions to the CNS" has been prepared and is currently under internal review within the CNS. Once approved, the guide will be issued to Eskom.

CNS Review Plan for Safety Assessments.

A Review Plan on Safety Assessments for Nuclear Power Reactor Sites and Submissions to the CNS" has been completed and will be issued for use by CNS technical assessors once the corresponding licence guide (see above) has been approved.

C.1.1.1.6 To develop the CNS regulatory PRA as a more dynamic assessment tool, e.g Risk Spectrum.

Limited progress has been made on upgrading the CNS Koeberg PRA study. The independent development strategy of the CNS PRA using the new program "Risk Spectrum" is being optimised in terms of the current resources available and will be progressed further during 2000.

C.1.1.1.7 To establish defined proactive work programmes.

Assessment of Computer Codes.

COBRA Code - COBRA is an established computer code that models the thermal-hydraulic behaviour of the coolant in the core of a light-water reactor during steady state and transient operation. This code is currently being re-installed on a Unix platform at the CNS. While its most common application is the analysis of in-core thermal-hydraulics during accident conditions, the introduction of new Westinghouse fuel into the Unit 1 core of Koeberg provides a further area of application for this code, as differences in fuel design give rise to distinctive flow patterns. During the transition from Framatome to Westinghouse fuel, the core will contain a mixture of the two types of fuel assembly, and COBRA can be used to assess the thermal-hydraulic compatibility between them.

RELAP5 Code - The latest version of the reactor system code RELAP5 (Mod 3) was ordered from the USNRC in terms of the CAMP agreement, and has been installed on a suitable platform at the CNS. RELAP5 is a reactor systems code, capable of modelling the primary and secondary coolant loops, including all thermal-hydraulic components such as pumps, pressuriser, steam generators, etc, as well as all control and safety systems. As such, most transient and accident scenarios of the Koeberg reactors can be analysed.

RELAP5 can also be applied to the SAFARI research reactor, particularly in the context of the Safety Analysis Report due to be submitted to the CNS during 2000, which describes, inter alia, the behaviour of the system under a series of off-normal conditions. The Pebble Bed Modular Reactor, though differing from these systems in being a helium-cooled device, is also capable of being modelled using RELAP5.

Koeberg Flux Mapping Code - During a visit to France, discussions were held with the developer of the flux mapping module, SQUALE, of the SCIENCE code system, in order to establish the qualification of the module. SQUALE is used to process the monthly measurements of the neutron flux within the reactor core during operation. The use of this module at Koeberg will acquire new significance when fuel is routinely stored in the re-racked fuel storage pools, as the level of depletion of discharged assemblies is determined from the results obtained. Another aspect, namely the qualification of the users of SQUALE at Koeberg, was also pursued and found to be satisfactory. Approval for the replacement of the old, mainframe-based codes by SQUALE, was provided to Eskom.

Severe accident codes - A number of severe accident computer codes has been obtained from the USNRC, but these have not been implemented yet owing to other more urgent priorities.

Coopra agreement with the US NRC.

In terms of this agreement, the CNS is awaiting an update of the USNRC Low Power and Shutdown Accident status report, which will include material submitted at the San Francisco meeting in August 1999 attended by the CNS.

Materials Investigations.

The material used on the primary circuit in cast form, e.g. elbows and nozzles, is of duplex stainless steel. It has been recognised that this material undergoes thermal transformation at operating temperatures, leading to varying degrees of embrittlement depending mainly upon its chemical composition. The CNS is proactively investigating this phenomenon in various ways:

Experimental cast duplex stainless steel castings have been manufactured and samples sent to Potchefstroom University for chemical analysis prior to ageing and

mechanical testing.

Other material has been obtained from items replaced at KNPS. A section of a primary pump thermal barrier cover has been thoroughly decontaminated and transported to the Eskom materials research establishment. This material will be used to investigate the effects of prior deformation (e.g. during shop hydrotesting) on the mechanisms of thermal ageing embrittlement.

Investigations into the deformation of primary pump bowls during hydrotesting are also being made in collaboration with the Centre for Research in Computational and Applied Mechanics (CERECAM) at UCT.

C.1.1.2 Conditions of Licence.

C.1.1.2.1 To undertake a review of the Koeberg conditions of licence.

Licence change requests (LCRs).

During the reporting period forty nine licence change requests and thirty minor change requests were submitted by Eskom and assessed by the CNS.

Radiation Protection Organisation.

The issues surrounding the RP Organisation in terms of conditions and requirements in the Koeberg licence NL-1 have now been resolved and approved in principle by the CNS. The CNS awaits an LCR that would contain the revised Standard KSH-010 as well as a request to amend the relevant Condition of Licence.

Process-based licensing.

The existing licensing framework for Koeberg is reflected in the present nuclear licence (NL-1) which makes explicit reference to extensive Koeberg documentation which is not always tailor-made for an efficient regulatory framework. This results in numerous "licence change request" submissions to the CNS whenever a change is to be made to this documentation, many of which are not significant as far as nuclear safety is concerned. To achieve a more focussed licensing approach, consideration was given several years ago to addressing this problem.

Following discussions on this issue, and taking international regulatory practices into consideration, Eskom and the CNS agreed to move towards a more process-based licensing approach. In terms of this approach, the nuclear licence would focus on the necessary processes to ensure nuclear safety. These would address the validity of the documented safety case and safety standards, safety analysis and operating procedures, the updating thereof, ongoing review thereof, plant monitoring, feedback and follow-up actions by the licensee. A screening

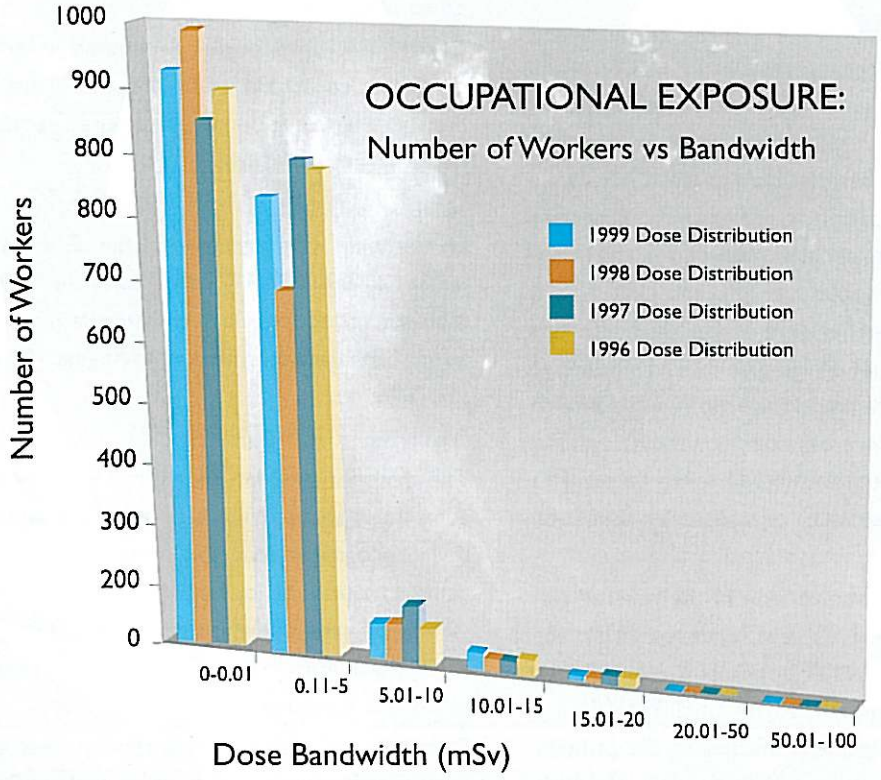


Figure 1. Occupational dose distribution from 1996 to 1999.

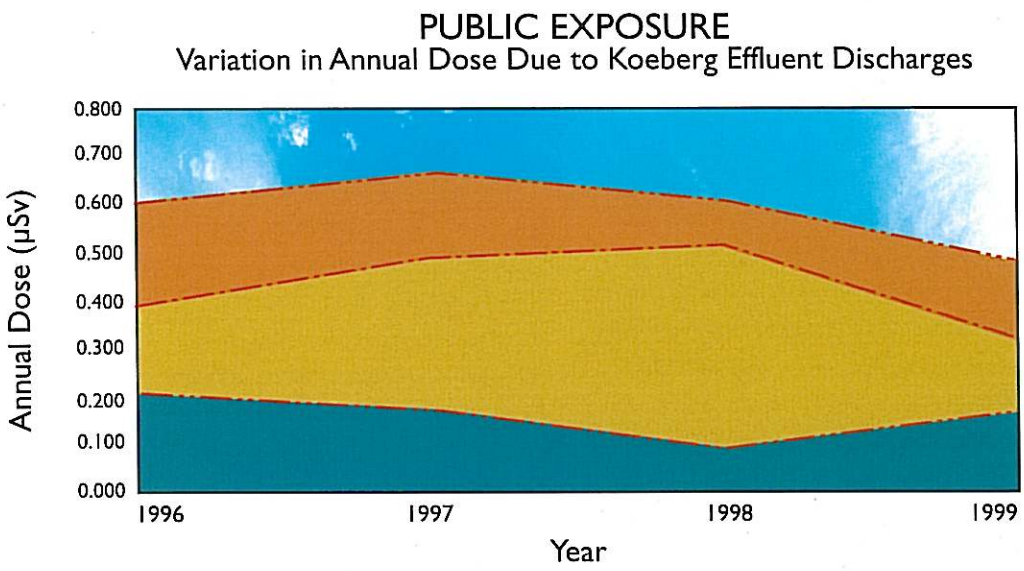


Figure 2. Variation in public annual average dose due to effluent discharges (liquid and gaseous) from Koeberg

process would be used to identify changes requiring CNS approval. Safety indicators would be used as a measure of compliance with safety requirements. The CNS would, however, continue to conduct inspections on the plant, but these could be focussed by the use of such indicators. The CNS would in addition monitor the Eskom corporate organisation responsible for ensuring compliance with these processes.

With this objective in mind, both Eskom and the CNS have conducted a re-organisation in respect of their Koeberg safety and licensing functions. Eskom has established its corporate nuclear safety organisation "Generation Safety and Assurance". In 1998 the CNS established the Koeberg Project Department by adding a technical assessment group to the existing inspection department, and giving it overall responsibility for the licensing of the plant.

Over the past year progress has been made towards establishing the concept and tools for process based licensing. These include items such as the CNS guidelines for safety assessment, Eskom conduct of operations document, Eskom screening and safety evaluation process, and safety indicators. The CNS is currently revising its inspection and monitoring programme to accommodate the new approach. Progress has however been slow due to the ongoing regulatory activities. Nevertheless it is the intention of both organisations to achieve this objective during 2000.

C.1.1.3 Compliance Assurance.

C.1.1.3.1 To ensure compliance with the dose limitation system for individual workers and members of the public.

Occupational Exposure to workers.

Radiation exposures to personnel working at Koeberg Nuclear Power Station are subject to control by the operational radiation protection programme. This programme enables the identification of situations that could lead to radiation dose accrual such that controls

% Of AADQ Discharged In Effluent During 1999			
Atmospheric Transport Pathway		Liquid Transport Pathway	
Radionuclide	% Of AADQ	Radionuclide	% Of AADQ
^{134}I	21.42	^{57}Co	13.23
^{132}I	4.97	^{58}Co	13.01
^{3}H	48.99	^{60}Co	6.50
^{60}Co	20.43	^{110}mAg	11.20

Table 1. Radionuclides contributing the highest dose as a result of atmospheric and liquid discharges

can be exercised to ensure that doses are both maintained as low as reasonably achievable (ALARA) and within the annual individual dose limit.

The highest annual individual dose accrued during 1999 was 20.35 mSv compared to the regulatory annual limit of 50 mSv. The total annual collective dose to the workforce for the year of 1999 was 1.75 Person-Sievert. The total occupationally exposed workforce during 1999 numbered 1 756 indicating an average annual individual dose of approximately 0.98 mSv. This compares favourably with the regulatory requirement of 10 mSv per annum imposed on the average annual individual dose to ensure that all doses are kept ALARA. Figure 1 illustrates the dose distribution arising from the individual exposures accrued from 1996 to 1999.

The major contribution to the total collective dose was the refuelling outages (outages 110 and 210). The collective dose for outages 110 and 210 amounted to 1.45 Person-Sievert. The collective dose accrued as a result of the outages contributed 83% of the total annual collective dose recorded for the year 1999.

Type of solid radioactive waste	No. of drums/y
C1 drums containing NCW	13
C1 drums containing concentrates	68
C1 drums containing resin	8
C2 drums containing resin	29
C2 drums containing concentrates	0
C4 drums containing filters	3
C2F drums containing filters	18
210 litre drums containing general trash	346
210 litre drums containing resin	106

Table 2. Inventory of solid radioactive waste produced in 1999 and drummed in various types of drums.

Public Exposure

The total dose to the critical group in 1999 as a result of gaseous and liquid effluent discharges was 0.172 µSv and 0.313 µSv respectively.

Effluent discharge

Various gaseous and liquid radioactive wastes are produced during the operation of Koeberg. These effluents are treated by dedicated clean-up systems, which remove most of the radioactivity from the waste effluents prior to discharge to the environment. However, during the operation of any nuclear power station it is inevitable that small amounts of radioactivity will be released to the environment.

Public exposure is controlled within strictly defined limits by the implementation of a radiological effluent management programme, which ensures that the discharges of radioactivity from Koeberg result in no risk to members of the public. A key feature of this programme is the control of radioactivity in effluent discharges to within the Annual Authorised Discharge Quantities (AADQ). These quantities are established by way of the safety assessment process. In addition to continuous monitoring of radioactivity in effluent, radiological surveillance of the environment is also carried out. In this way an independent and strict control on public exposure from effluent discharges is maintained.

Figure 2 shows the variation in public annual average dose due to effluent discharges (liquid and gaseous) from Koeberg from 1996 to 1999. Radioactivity in liquid and gaseous effluent discharged from Koeberg during 1999 contributed a total individual dose of 0.485 µSv with 65% of this dose contributed from radionuclides discharged in liquid effluent. This falls well within the limit of 250 µSv per annum to the highest exposed member of the public.

It is evident that the annual dose arising from effluent discharges from Koeberg has been consistently low at less than 1% of the dose limit.

Table 1 indicates the radionuclides which contributed the highest dose as a percentage of AADQ discharged in effluent.

Considering all discharges, tritium was calculated to contribute approximately 57% of the total dose to members of the public from Koeberg radiological effluent discharges in 1999. (Its contribution to the total dose due to liquid releases amounted to about 26%.)

Waste Management – Arisings Plus Disposal Criteria Compliance.

Generation of solid radioactive waste amounted to 70 m^3 drummed in metal drums and 37 m^3 drummed in concrete drums. The total amount of processed solid low-level radioactive waste was 107 m^3. The inventory of the drummed radioactive solid waste produced in 1999 is given in Table 2

The shipment of radioactive waste to the Vaalputs

national radioactive waste repository in 1999 involved 81 m^3 of metal drums and 288 m^3 of concrete drums. The former were shipped in the fourth quarter and the latter throughout the year.

Environmental Monitoring

The Koeberg environmental surveillance programme, involving sampling and analysis of representative environmental media, is performed in order to verify that effluent discharges have been effectively controlled and that no unexpected build-up of environmental levels of radioactivity are arising as a result of the discharges.

The small amounts of tritium released from Koeberg could not be identified in either surface water on land or in seawater. Sensitive gamma spectrometric measurements of biological materials, soil and air samples, vegetation and food, did not reveal any contamination, although very small quantities of 110mAg, originating from Koeberg operations, were found in some marine samples. As a demonstration of the equipment sensitivity, natural radioactivity is routinely measured in the majority of samples in which none of the effluent activities are in evidence. Very small amounts of characteristic activities in Koeberg effluent could be identified in sewage sludge, while reportable activities of 131I, originating from therapeutic or diagnostic medical treatment of local residents, were detected on various occasions in Melkbosstrand sewage sludge. A widespread network of environmental thermo-luminescent dosemeters (TLDs) around Koeberg monitors the external exposure to active gaseous effluents from Koeberg. The TLDs indicated a small increase above the norm for May 1999 that was attributed to variations in natural background radiation. In total, the environmental surveillance programme has demonstrated adequate control over effluent discharges in the period under review, and confirmed the minimal impact to the surrounding environment and population.

Eskom has been requested to identify a suitable standard (e.g. ISO/IEC) with which the replacement computing system (hardware, software and procedures) for radiation protection processing and records must comply. Although nominally satisfied by the preliminary inspection, the proposal was to keep recognition of the old system as the legal record until such time as the CNS had subjected the new system to an extensive audit.

C.1.1.3.2 To implement a risk focussed compliance inspection programme at KNPS.

The CNS safety indicator system for monitoring Koeberg has been finalised and established on an electronic database. The indicators are presently being linked to the compliance inspection and quality assurance programmes as well as technical assessment activities, plant occurrences etc. This programme will be implemented during 2000.

The purpose of this development is to provide an improved framework for reporting, assessment and monitoring of findings, a more focussed licensing and enforcement programme, and to revisit the compliance inspection programme.

Compliance Assurance Activities

Unit one - The unit operated for 84 days continuously before shutting down for a two-day outage in May to undertake repair work on the turbine. Three days after the return to power the unit was manually tripped due to a loss of the turbine auxiliary cooling system. Following a five-day outage for repairs, the unit was returned to power and has been on-line continually up to the end of the reporting period. The unit power was reduced to 64% during the millennium change-over period as a safeguard against possible grid failure and a possible 'brown out' situation (Y2K contingency). The unit suffered a partial loss of power due to high electrical generator stator bar temperatures, a problem that has been temporarily managed by issuing a 'temporary operating instruction' and changing an operating set point. On-line repairs are currently unavailable and a modification is being prepared for when the unit is shut down for the next scheduled outage 111.

Unit two - The unit operated continually for 181 days until the commencement of outage 210 on 17 September. The unit was returned to power on 3 November and remained on line until 20 December when a faulty temperature sensor on one of the main generator transformers caused the unit to trip. Following a five-day outage for repairs, the unit was returned to power and has been on-line continually up to the end of the reporting period. The unit power was reduced to 64% during the millennium change-over period as a safeguard against possible grid failure caused by Y2K and a possible 'brown out' situation.

Plant refuelling outages - The CNS monitored the refuelling outages on both units during 1999. This involved assessment of the outage safety case which addressed modifications, the outage plan and organisa-

tional aspects prior to the outage, monitoring of compliance with safety requirements during the outage, and quality assurance and quality control records following the outage. Problems with communications relating to work orders were observed, but this was satisfactorily addressed by Eskom.

Occurrences.

The reporting and follow-up of occurrences at Koeberg is conducted by way of a formal process.

A total of 595 occurrences were reported during 1999 of which seven were rated at level 1 on the IAEA - INES (International Nuclear Event Scale) scale. The scale is used for purposes of reporting occurrences to the public with a view to providing some perspective. The scale runs from occurrences of no safety significance – level 0, to major nuclear accidents – level 7. An incident occurred on 7 October 1999 in which the Unit 2 reactor cavity was overfilled with water. This was rated 0 on the INES scale, which implies no safety significance. The incident occurred during an outage and there was no fuel in Unit 2 at the time and no consequential effect on safety.

The INES level 1 events typically involve some anomaly beyond the authorised operating regime, but do not involve unacceptable exposure of personnel to radiation or a failure of protective barriers.

Of the occurrences overall for 1999, 56% have been closed out and all corrective actions completed, 14% are in an interim status with corrective actions identified but not fully implemented and 30% are still open with corrective actions still to be identified. The CNS monitors the follow-up and close-out process and has no major concern at this stage.

Maintenance

This was the first full year that the new maintenance process was in place at Koeberg. Regular specialist meetings took place which considered :

- maintenance effectiveness,
- reliability monitoring and feedback to the probabilistic safety assessment (PSA),
- interface between the maintenance engineering department and the various other maintenance related disciplines (e.g. Inspection & Test department),
- ensuring a sound interface between the Koeberg PSA and Maintenance,
- integration of international experience into the maintenance process,
- the programme and timeframe for Eskom to establish maintenance bases for all Critical Safety Related (CSR) & Safety Related (SR) Systems, Structures and Components (SSCs) as required by the licence NL-1.

The CNS is monitoring implementation of the maintenance programme as required by the licence. Some concerns have been identified by the CNS regarding implementation of some elements of the programme and these are being discussed and will be progressed for resolution at forthcoming meetings of technical specialists.

The CNS has noted Eskom's intended expansion of the process to a plant-wide integrated maintenance approach and also its proposals to align the maintenance and monitoring practices with those of the French electricity utility EdF, which operates the French nuclear power stations.

In-Service Inspection (ISI)

Specialist meetings took place during March, June, September and November 1999 attended by the Eskom inspection & test department manager, specialists from CNS and Eskom Generation Safety and Assurance. The main items of consideration are summarised below.

Dead End Piping - these are branch pipes to the primary circuit and have been found in similar plants abroad to be prone to thermal fatigue cracking. The CNS has required Eskom to provide a formal safety justification related to this phenomenon. In part response Eskom has submitted documents supporting a leak-before-break approach. It is the intent that this approach will justify continued operation of the plant until such time that a modification is made that will provide a long-term resolution of the concern.

A preliminary safety case for continued operation with leaking steam generator tubes has been received and assessed by the CNS. Resulting comments were transmitted to Eskom and discussed at specialist meetings. In parallel, Eskom set up a Steam Generator Health Care project with the initial purpose of compiling a file of all relevant documentation pertaining to steam generator maintenance, inspection and operability. This file is now complete and will be used as a support for the revised tube integrity safety case. In the meantime, EdF has reported on poor correlation of steam generator tube leak rates and the results of eddy-current inspection results. This aspect will feature in the revised safety case.

During routine reactor vessel inspections in France, spurious indications were found in the Tricastin Nuclear

Power Station on vessels similar to those at Koeberg. From discussion at technical specialist level it is considered that the manufacturing and inspection history of these vessels may account for the indications found. The history of the Koeberg vessel inspections is quite different and to date no such indications have been detected at Koeberg. Both Koeberg vessels were inspected during the period 1997/8.

As part of the requirements for the in-service inspection programme, Eskom has initiated a Performance Demonstration programme for some of its non-destructive examination (NDE) methods. Documents reporting on that part of the programme dealing with inspection techniques used for ferritic components have been submitted for assessment. In summary, the ultrasonic testing procedures used on ferritic components are satisfactory. However, human reliability is an issue that needs to be pursued. The second phase of the programme dealing with examination techniques for stainless steel components has started. One general conclusion so far is that the radiographic techniques used cannot be qualified as flaw detection techniques.

It has been discovered that many of the original radiographs from the construction phase of the plant are deteriorating such that corrective action needs to be put in place to retain the information on them. One option that is being investigated is that of digitising some or all of this information. A feasibility study is underway on this matter.

Proposed changes to the Reactor Vessel Surveillance Programme were discussed extensively and agreed to by the main role players (see C.1.1.1.7).

Reactor Vessel Surveillance Programme – RVSP.

The Reactor Vessel Surveillance Programme (RVSP) is a licence requirement imposed in order that the in-service irradiation embrittlement of the reactor vessels can be monitored in advance using samples of the vessel material. The RVSP reports relating to the testing of the first two capsules have been received and are currently under review. Preliminary findings are that the vessels will comply with Pressurised Thermal Shock (PTS) criteria for at least the design life of forty years.

Discussions with Eskom have been held regarding certain changes to operational practice and how these could influence the embrittlement, e.g. the impact of the new fuel practice and the introduction of Operation at Reduced Temperature (ORT). A reduced neutron flux of 36% will be achieved at cycle 40 for each unit. However, ORT is likely to increase the degree of embrittlement. CNS considers that changes need to be made to the programme to take cognisance of these factors. Changes to the programme have been discussed and Eskom has agreed to submit an appropriate licence change request.

Maintenance and Testing Inspections.

There was a considerable scope of in-service inspection during the outages. General compliance inspections were carried out on a sample basis to ensure that:

- Inspections and tests are carried out by qualified personnel using approved procedures.
- The results of the examinations are correctly assessed against the specified acceptance criteria.
- The recording, reporting and resolution of non-conforming items are performed correctly.
- All the corrective actions, including repairs and replacements, are carried out satisfactorily in accordance with approved procedures.

The CNS also verified that all the Non Destructive Examination (NDE) packages with recorded indications had been correctly documented, and that the indications had been correctly resolved. Additional inspections were performed on the dead end piping, SG tube examinations, ARE/ASG branch welds, various pumps, valves, and welds. No concerns were raised.

Control Room Inspections.

Control room inspections were performed daily by the CNS inspectors in both control rooms. The inspections were performed to ensure that the units are operated according to the conditions of the site licence. No major concerns were reported.

C.1.1.3.3 To implement a monitoring programme to assess the effectiveness of the Eskom Nuclear Governance Organisation (Generation Safety and Assurance –GS&A).

The CNS required a number of audits to be incorporated into the Koeberg Integrated Monitoring Programme. During the reporting period the CNS participated in the following audits:

- Generation Safety and Assurance (Eskom Corporate)
- Safety Assessment Process
- Technical support organisation
- Koeberg training and qualification

With regard to the first three audits, the main findings

related to insufficient resources, clarity on the documented processes, interfaces, auditability and independence of the safety assurance function.

The main conclusions of the Training Audit were that the high turnover of staff results in training resources being concentrated on initial training. The Koeberg overall training organisation has been identified as requiring some restructuring. The appointment of a training manager reporting directly to the Power Station Manager was seen in a positive light and will be followed by a reorganisation of training. While training is considered generally adequate, the present drive to align with international practice is necessary to provide a future benchmark.

The recommendations and findings identified during these audits are tracked at the Koeberg Safety Assurance Group (KSAG) monthly meetings held between Eskom and the CNS. Progress in addressing the issues is generally satisfactory.

C.1.1.3.4 To implement a regulatory process to ensure that Eskom has addressed Y2K compliance issues on the Koeberg plant.

The CNS interacted with Eskom during numerous project meetings to ensure that all aspects related to computer software were investigated in terms of the "Y2K" issue and the possible impact on nuclear safety at Koeberg. The CNS was satisfied with the arrangements implemented by Eskom and also with its contingency plans, which were put in place for the transition period.

The main problem envisaged was one of grid instability due to low demand rather than plant computer and control system problems. However, actual grid demand was approximately 17GW at the turnover. The forecast demand was 14GW and problems were expected only if the demand had fallen to 7GW.

The CNS also implemented a contingency plan during the transition period to ensure the availability of licensing support if required. To this extent, a temporary addendum to AD-1036, "CNS Response to the Notification of an Emergency at a Licensed Nuclear Installation" was prepared which established the additional preparedness required by CNS during the Y2K transition period. The plans were exercised jointly with KNPS. During the actual transition period, the CNS Emergency Control Centre was manned and used to bridge communications with the International Atomic Energy Agency, various international regulators and South African licensees. CNS personnel were also in attendance at Koeberg and Pelindaba. No issues arose during the transition period.

C.1.1.3.5 To develop and implement a regulatory safety indicator monitoring system, in accordance with the CNS policy, against which the nuclear safety status of Koeberg can be measured. In this process, reference will be made to the outcome of the Convention on Nuclear Safety review meeting held in April 1999.

Refer to C.1.1.3.2 above. It was confirmed that all parties to the Convention on Nuclear Safety were completely satisfied with the South African National Report on the Convention and also with the manner in which nuclear safety was being addressed at Koeberg.

C.1.2 PEBBLE BED MODULAR REACTOR.

C.1.2.1 Safety Assessment.

C.1.2.1.1 To conclude the programme of work necessary to come to a decision on the licensibility of the PBMR conceptual design and formulate the necessary conditions for the granting of a first stage PBMR Licence.

Evaluation and Approval of the Eskom Licensing Philosophy for the PBMR.

The requirements for licensing of the PBMR are set down in the standards document discussed in B.1.4. Following numerous interactions between Eskom and the CNS, the licensing philosophy for the PBMR was finalised and agreed. Eskom will produce a Safety Case that will present the overall intellectual safety argument for the PBMR and describe how it be complied with.

The Safety Case will provide a logical linkage between the blank design basis, the safety assessor and the general operating rules of the plant.

The Safety Case will be complemented by the Safety Analysis Report (SAR) which is the principal document to demonstrate that the proposed plant can be designed, constructed, operated and decommissioned in compliance with the CNS nuclear fundamental safety criteria and licensing requirements for the PBMR. It will present details of the plant design, the site and environs, the design principles and the various detailed analyses required to demonstrate the safety case.

The first step in the CNS licensability assessment of the proposed PBMR concept is to review and accept the Safety Case, in conjunction with the first revision of the Safety Analysis Report (SAR). It is anticipated that this documentation will be available towards the middle of

2000.

Evaluation of the Design Basis of the PBMR.

Eskom has submitted preliminary documentation in support of the various elements that need to be addressed for the establishment of the licensing basis as identified in the Safety Case. The main documents are:

- The proposed PBMR plant technical description
- Methodology for the identification of events
- Methodology for defining the general design criteria
- Methodology for defining the specific design rules. Within this topic Eskom has provided the following submissions
  - Methodology for design failure analysis of structures, systems and components
  - Methodology to establish the safety classification system for structures, systems and components
  - Methodology for loads determination
  - Methodology for the safety assessment and licensing basis event classification including the PBMR Probabilistic Risk Assessment Phase 1
  - Methodology for design qualification

The majority of these preliminary documents have been reviewed by the CNS and are still under discussion between the CNS and Eskom. They will require further reviews before a meaningful evaluation of the PBMR design basis can be finalised. This objective will be progressed during 2000.

Licensing Guidance.

As part of the licensing process, the CNS has identified the need to formulate more specific guidance to Eskom, in terms of meeting the requirements set out in CNS document LG 1037 " Basic Licensing Requirements for the Pebble Bed Modular Reactor". To this extent the CNS has developed a guidance document (LG-1039) "Information to be submitted in support of the PBMR licence application" which provides guidance as to the contents and level of detail expected of submissions to be submitted to the CNS. This document is being finalised through the internal CNS standard development process and was submitted to Eskom for comment.

Development of a Safety Assessment Review Guide for CNS Review.

A safety assessment review plan is being developed to provide guidance to the CNS staff who will review submissions on the PBMR. In developing the plan, use is being made of the USNRC "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants".

Specific Proactive Safety Assessment Topics.

Core Neutronics - A core neutronics model, developed at the CNS, has proved useful in assessing the preliminary core design proposed for the PBMR. One of the CNS reactor physicists received training in the use of the German computer code package used in the design of the core. It is envisaged that a copy of the package will be installed on a computer at the CNS.

Irradiation Embrittlement - The effect of the originally proposed working temperature of 120°C on the irradiated ferritic pressure boundary materials was examined; it was concluded that severe embrittlement would be expected. A proposal was made in that the steel grade should be revised. Subsequently, the designers proposed an operating temperature regime in the order of 300°C - the irradiation effects are now expected to be small.

ASTRA nuclear testing facility in Russia - Eskom intends to perform a number of criticality tests at the ASTRA nuclear testing facility in Russia. This facility is used for zero power criticality tests. It has a core with the radial dimensions scaled down to 50% of those of the proposed PBMR core. A first demonstration test has already been performed. The CNS participated in the meeting where the test facility was presented. This test programme will be mainly used for verification of computer codes for reactor physics calculations performed during design and safety evaluation stages.

C.1.2.2 Conditions Of Licence.

C.1.2.2.1 To formulate conditions of licence indicating the requirements which will have to be met should the project develop further than a conceptual design, following completion of the "Safety Assessment" phase.

The safety assessment phase is still under consideration and at this stage no licence has been issued as yet.

C.1.2.3 Compliance Assurance.

C.1.2.3.1 To ensure that all quality assurance requirements for pre-licensing activities are fulfilled.

Two CNS pre-audit assessment reports on the PBMR programme were finalised and the findings addressed to Eskom. These are being addressed during the regular PBMR Quality Assurance meetings between the CNS and Eskom/PBMR.

C. LICENSING PROJECTS

Quality Management

The Quality Management Programme of the Eskom PBMR project is still being developed and finalised. The CNS raised some concerns with Eskom on this situation, especially given the fact that safety submissions are being prepared and presented to the CNS (refer above) without an approved and documented quality management programme. The programme must, inter alia, identify arrangements for independent review prior to submission to the CNS. The matter has been discussed with Eskom and is being addressed.

Project Management

PBMR Licensing Project and PBMR Project Licensing Liaison Committee (PLLC) meetings continued on a monthly basis. PLLC meetings address the more strategic issues related to the PBMR Programme while the PBMR Licensing Project PLPM meeting addresses progress of the licensing project.

Licensing fees for the continuation of the project up to March 2000 were determined and agreed with Eskom. Discussion on licence fees for the forthcoming year have commenced.

The CNS engaged the services of overseas consultant companies with specialist capabilities in high temperature gas-cooled reactor technology to bolster its current technical assessment staff.

In terms of overseas technical support a memorandum of understanding between the JAERI and the CNS on information exchange has been signed. JAERI is a Japanese institution playing a major role in the development of high temperature gas-cooled reactor safety philosophy in Japan.

The CNS is currently reviewing its strategy in terms of staffing and the future use of overseas consultants. The existing agreements terminate in March 2000. An option under consideration is to increase the CNS staff complement on the PBMR project and make use of consultant services only on identified specific cases.

PBMR Environmental Impact Assessment

In terms of the Environment and Conservation Act, the siting and construction of the PBMR is subject to an Environmental Impact Assessment (EIA) which calls for public consultation. The licensing process also calls for public consultation and the CNS and the Department of Environmental Affairs and Tourism (DEAT) engaged in discussions to determine a single public consultative process which will satisfy both the licensing and EIA requirements. In terms of this parallel process the CNS will address the nuclear/radiological protection/radioactive waste and nuclear emergency planning aspects while the conventional environmental impact aspects will be considered by DEAT.

Eskom has initiated the EIA process by appointing an independent consultant, as required by the Environment Conservation Act, to conduct the EIA. Preliminary discussions between Eskom, its consultant and the relevant governmental organisations have taken place. Continuation of the process is pending further consideration from the government. The arrangements for the single public consultative process will be finalised during 2000 once it is decided whether the project will be taken further.

IAEA PBMR Technical and Economic Feasibility Study and Safety Study

The IAEA was requested by government to undertake an independent review of the technical and economic feasibility of the PBMR and a review of its safety. The activities identified by the IAEA for the economic and technical feasibility study have been completed. Limited input from the CNS was required in these activities since the safety aspects of the PBMR were dealt with in detail by the safety study. The team reviewing the safety of the proposed design visited South Africa in February 2000 and the CNS provided the necessary input in terms of licensing approach and requirements. Reports will be finalised and provided to the government.

C.2 RADIOACTIVE WASTE MANAGEMENT

C.2.1 To review waste acceptance criteria for all licensed storage and disposal facilities for adequacy.

The waste acceptance criteria in use by the AEC at the Pelindaba site have been reviewed and a number of issues were identified requiring resolution. These were identified to the AEC which is considering the issues and has undertaken to respond. The



Mr Sietse van der Woude
Senior Manager:
Mining, Waste and Nuclear Technology

current waste acceptance criteria at Vaalputs are in line with the IAEA waste classification document. Comparison of these criteria with criteria used in other countries is ongoing.

C.2.2 To initiate moves that will ensure that the rehabilitation of any contaminated sites not yet being addressed takes place.

The CNS identified a number of contaminated off-mine sites during 1993. These sites had been contaminated by various activities involving the refurbishment of contaminated items from the mining and minerals processing industries, the re-cycling of contaminated scrap material or the uncontrolled disposal of contaminated wastes. At the time of discovering the sites, a certain number could be related to the activities of particular mines, particularly in Phalaborwa. For the majority of sites in the Gauteng and Free State areas, around forty sites in all, the actual mines responsible for the contamination were less easy to determine. Following protracted discussions, the mining industry collectively undertook to make funds available to investigate suitable rehabilitation mechanisms and then to rehabilitate the affected sites. The availability of the latter funding was made contingent on the identification of a disposal option for the more concentrated long-lived radioactive wastes that would arise from the rehabilitation process. The absence of a national waste management policy has made determination of such an option difficult, as a result of which little progress has been made on cleaning up the contaminated sites.

In an effort to progress this matter, further meetings were convened with representatives of the mining industry where various possible options were identified. These options are being evaluated for feasibility and suitability. A response is awaited from the industry on its position on the various options.

C.2.3 To pursue recommendations arising from the IAEA peer review in respect of safety assessment for the Vaalputs repository.

During 1997 a number of concrete waste disposal containers which had been placed in the disposal trenches at the Vaalputs waste repository were found to have fine cracks in the walls through which a small amount of radioactivity had migrated. Whilst not giving rise to any significant radiation hazard, it was deemed necessary to determine why this migration of radioactive material had taken place and what if any could be the longer term safety implications. At the time of the incident, irregular shipments of waste were being made from Koeberg to Vaalputs which had caused the containers to remain uncovered for longer than anticipated, and there had been uncharacteristically high levels of rainfall. From initial investigations it had been assumed that the drum had been overfilled and that waste had spilled into the gap between the inner metallic drum and the concrete wall of the container. It was then assumed that rainwater had percolated into the drum and leached out a certain amount of radioactive material from the gap, which had subsequently migrated through the fine cracks in the container walls. The incident gave rise to a degree of negative public reaction and the AEC requested the IAEA to conduct an independent review of the safety of Vaalputs and the operational controls in place.

The IAEA review took place during 1998 and the findings and recommendations were provided to the AEC in early 1999. The AEC has begun addressing the recommendations. Inter alia, an audit of waste management activities at Koeberg Nuclear Power Station was conducted by AEC personnel as recommended. Although no formal report has been submitted to the CNS to date, initial indications are that there were no major deficiencies in the way the waste drums are presently prepared at Koeberg.

C.2.4 To review conditions of licence for adequacy and appropriateness with particular reference to acceptance criteria, compliance with acceptance criteria and safety assessment.

Following review it was found necessary to make only one change to the licence conditions during this period. This was for incorporation of the revised document on the control of sources.

C.2.5 To ensure compliance with the dose limitation system for individual workers and members of the public.

Radiation doses to workers at the Vaalputs site were maintained at low levels and were well within prescribed limits. There were no effluent discharges from the site and no public exposure occurred.

C.2.6 To determine adequacy of the Y2K programme.

A contingency plan was submitted for Vaalputs in preparation for possible problems related to the Y2K changeover. No actual problems were experienced at Vaalputs during the changeover.

C.2.7 To develop and implement service standards

applicable for regulatory review and control activities.

A service standard for the evaluation of AEC safety reports is under development.

C.2.8 To develop and implement a regulatory safety indicator monitoring system, in accordance with the CNS methodology, against which the safety status of the activities can be measured.

Work on the development of a basic set of indicators has been undertaken and is nearing completion. The tracking of these indicators as a measurement of safety status will be undertaken in the forthcoming financial year.

C.3 NUCLEAR TECHNOLOGY

C.3.1 ATOMIC ENERGY CORPORATION - PELINDABA SITE

C.3.1.1 To undertake licensing of all activities covered by the Nuclear Energy Act.

Forty-nine licence change requests were approved during the year. The approval of qualification tests for the new 300g SAFARI fuel was of particular significance. This is a first step towards the approval of the fuel upgrade in the SAFARI reactor core. The probabilistic safety assessment (PSA) for the SAFARI fuel fabrication facility (ELPROD) was evaluated and approved. A consolidated PSA for the decontamination facility was also evaluated and approved. This facility is increasingly playing a major role in the decommissioning phase of the closed plants.

The evaluation of PSA's from three other facilities is at an advanced stage. Upon approval of the three facilities, the process of retrospective licensing of production facilities will draw to a close for the Pelindaba site facilities.

C.3.1.2 To progress the Safari safety review with a view to completion in the year 2000.

In accordance with international practice to regularly review the safety assessment of reactors, a review of the SAFARI safety was initiated during 1998. Documents forming part of the Safety Analysis Report (SAR) were received and evaluated during the past year. Comment has been provided on some of these documents and the final and comprehensive SAR is expected by March 2000.

C.3.1.3 To undertake an assessment of the impact of chemical plants on nuclear safety.

Discussions have taken place with the AEC to identify the conventional plants on the site which may have an impact on the safety of nuclear facilities. The AEC is in the process of compiling a comprehensive site risk assessment that will include consideration of the impact of chemical plants on nuclear safety.

C.3.1.4 To undertake a review of licence conditions to ensure ongoing adequacy with particular reference to internationally endorsed standards.

Licence conditions pertaining to the reporting of occurrences have been reviewed and revised to provide clarity on the reporting period.

C.3.1.5 To review and revise the compliance assurance programme taking into consideration the safety indicators that will be developed during the reporting period.

The basis for the compliance assurance programme was reviewed and revised. The revised programme was documented and implemented during the year.

One hundred routine and forty-three non-routine compliance inspections were conducted during the year. No major findings were made during these inspections.

The inspections included extraordinary audits conducted following a criticality accident in Japan. This accident involved an unplanned criticality excursion caused by operators failing to follow established procedures. There were no findings that would represent a threat of a similar criticality incident at the AEC facilities.

Sixty-nine occurrences were reported during this period. Although most of the occurrences were of a minor nature, a small number were of more significance and are reported below.

Iodine Spill at the Hot Cell Complex of the AEC.

During November 1999 there was a significant spill of iodine in the Hot Cell Complex of the AEC. No release to the environment took place and some workers received radiation doses that were measurable but well below the dose limits. The CNS required the AEC to include safety culture considerations and the possible effect of production on safety in the ensuing investigation. The investigation report recommended increased management oversight and the AEC is in the process of implementing these recommendations.

Fire at Thabana Waste Storage Facility.

A veld fire spread to one of the trenches at the Thabana waste storage facility that had been opened previously by the AEC. It was not possible to determine the specific cause of the veld fire. Results of radiation monitoring in the environment submitted by the AEC confirmed that there was no overexposure of either members of the public nor of any of the personnel involved in extin-

guishing the fire. Following the incident the CNS required the AEC to close the open trenches by an approved method.

C.3.1.6 To demonstrate that compliance with the dose limitation system for individual workers and members of the public has been achieved.

The highest individual dose at the AEC was 23,28mSv per annum, while the average dose to the occupationally exposed workforce was 0,503mSv .These complied with licence requirements for doses to be maintained as low as reasonably achievable and below dose limits.

The total dose to the critical group as a result of gaseous (Table 3) and liquid (Table 4) effluent discharges was 6.14 µSv and 89 µSv respectively. This was well within the 250 µSv public dose limit.

C.3.1.7 To review the environmental monitoring programme for ongoing adequacy and appropriateness.

The CNS evaluated and approved the AEC's revised environmental monitoring programme. The CNS also reviewed its own environmental verification programme and found it to be adequate and appropriate. The annual report from the Pelindaba environmental monitoring programme showed that no unexpected build-up of environmental levels of radioactivity occurred as a result of effluent discharges from the site. The results from CNS independent verification programmes also confirmed that discharges from the site were effectively controlled.

C.3.1.8 To demonstrate the adequacy of emergency planning arrangements.

A number of small-scale CNS observed emergency exercises were held to test particular aspects of the emergency plan during the year. One comprehensive exercise was held to demonstrate the effectiveness of the on-site emergency plan functionaries. The duration of the exercise was approximately one hour and was initiated by a stack release from the Hot Cell Complex. It was assumed that only noble gases were released but with a possibility that also radioactive Iodine could be released. The initial release rate was given as 1E10 Bq/s and escalated to a maximum of 4E11 Bq/s during a time span of fifty minutes. It was also assumed that all mitigating actions taken to stop the release failed. The exercise included a mustering exercise for all persons on the AEC site including persons who leased office and factory space on the site. Transport needs for the evacuation of personnel were also tested. No major deficiencies were found during the exercise. However, the CNS expressed concern regarding the availability of transport on the site.

C.3.1.9 To assure progress in respect of the various decommissioning and decontamination programmes.

Approval was granted for the decommissioning of the Molecular Laser Isotope Separation (MLIS) facilities and facilities at BEVA that had been used to manufacture light water reactor fuel for Koeberg. The dismantling of the latter facilities proceeded without incident. Most of the equipment from the fuel fabrication facility had been sold and transported to China.

C.3.1.10 To determine the adequacy of the Y2K programme.

A major drive was undertaken by the CNS for all the AEC nuclear facilities to ensure that all safety related sys-

Gaseous Discharge Type	% of the AADQ Discharged	Public Dose Due to Discharges [µSv]
Uranium	16.7	3.41E-01
Alpha Activity as ^{239}Pu	3.0	2.74E-04
Beta Activity as ^{90}Sr	<0.01	2.67E-04
Iodine Activity as ^{131}I	36.0	5.79E+00
Noble Gas as ^{85}Kr	<0.01	7.82E-03
Tritium	<0.01	5.92E-04
TOTAL		6.14E+00

Table 3 AEC Gaseous Effluent Management Data for 1999

Total Activity Released	% of AADQ Discharged	Public Dose Due to Discharges [µSv]
17.83	71	89.97

Table 4 AEC Liquid Effluent Management Data for 1999

tems would be Y2K compliant. The AEC was requested to submit a plan detailing strategies it would use to ensure Y2K compliance. In order to streamline communication, the AEC appointed three coordinators to liaise with the designated CNS official on Y2K matters. Action plans were requested and received from the various facilities on the AEC site. These were evaluated to determine whether there were concerns. There were no concerns other than the possible failure of the access control system, which was rectified. An internal audit was conducted by the AEC to verify the readiness of the facilities. In addition, another audit was conducted by an external IT company, following which certificates of compliance were issued to the various facilities. The CNS then requested contingency plans from facilities that were identified as higher potential risk as well as those that would be operational at midnight on 31 December 1999. These were submitted for evaluation and were deemed to be adequate. Since the SAFARI reactor was planned to remain operational during the changeover period, special emphasis was placed on the contingencies associated with the safety of the reactor. No problems were experienced during the changeover period.

C.3.1.11 To evaluate the adequacy of the waste management plan.

The majority of wastes, arising from activities at the Pelindaba site since its initial commissioning, have been stored on the site. The bulk of these wastes are from the extensive uranium refinement, conversion and enrichment activities that were undertaken over the years and from the decommissioning of the associated facilities. These wastes contain very long lived radionuclides. Low and intermediate level wastes from the operation of the SAFARI reactor and operational waste from various nuclear technology activities are also in storage. High level waste in the form of spent fuel elements from the SAFARI reactor are stored in a dedicated engineered underground pipe storage facility. The different storage facilities and conditions of storage vary considerably in terms of their medium to longer-term acceptability. Assessment and monitoring has demonstrated that, in the short term, no significant hazards are caused by these facilities but considerable resources will have to be expended on these wastes in order to ensure their safe management in the medium to longer term. Resolution of these issues is pending establishment of a national radioactive waste management policy which is presently under consideration by government.

In the absence of such a policy, the CNS and AEC have established joint mechanisms to evaluate the ongoing adequacy of the medium to longer-term radioactive waste management plan and to oversee its implementation.

C.3.1.12 To develop and implement service standards applicable for regulatory review and control activities.

A service standard for the evaluation of AEC safety reports is under development.

C.3.1.13 To develop and implement a regulatory safety indicator monitoring system, in accordance with the CNS policy, against which the safety status of the activities can be measured.

The CNS established a policy regarding safety indicators and is in the process of developing a specific system for application to the licensed activities of the Atomic Energy Corporation.

C.4 MINING AND MINERALS PROCESSING.

C.4.1 To progress licensing of all activities covered by the Nuclear Energy Act.

In terms of Regulation R.848 of 23 April 1994, March 1999 was the last date for facilities carrying out activities with radioactive material to apply for nuclear licences. Apart from the reports submitted by various companies and industries, the CNS conducted its own investigations regarding the radiation hazards at such facilities. From international experience, the industries that should be considered include the zircon, aviation, water treatment, oil and gas, coal burning power stations, building materials and phosphate industries. The CNS has prepared a summary report of all the available information and proposals regarding the regulatory control of these industries. Discussions with groups representing some of the above-mentioned industries have commenced.

No declarations for exemption were issued during the reporting period and nine nuclear licences were issued during the past year. The total numbers of licences that have been issued are:

- Mining and Minerals Processing 68
- Small users 23
- Scrap recycling 8

C.4.2 To finalise assessment of radiation hazards to the public from mining and minerals processing activities and to establish appropriate control and monitoring programmes.

The CNS evaluated the public hazard assessment reports submitted by licensees that gave rise to a number of comments which were subsequently discussed with the licensees. As part of the CNS review of these reports, a number of substantial technical issues have been identified that still need to be resolved before the CNS can confirm the results and conclusions in the reports.

Reports from licensees covering all of those that were due by December 1998, have been received. Other reports, of licensees that were authorised after 1997, are expected by June 2000.

Project team meetings were held with the licensees during September and October 1999 to discuss the comments on the hazard assessment reports that had been provided by the CNS. During these meetings the approach that would be followed in making submissions on Radiation Protection Programmes to control and verify control over public exposure was discussed. To date the CNS has received a number of submissions setting out the proposed control programmes which will be evaluated and authorised for implementation during the year 2000. The outstanding programmes are expected by April 2000.

Following discussions during the above-mentioned meetings, the need arose for the Harmony and Anglogold group of mines to make individual re-submissions to quantify the doses from individual mines rather than from a region. These reports were due in November 1999 and are still awaited.

C.4.3 To review the current hazard/risk assessment methodologies for different types of facilities in the light of international experience and to ensure consistency with CNS policy.

No progress has been made owing to the application of resources to other priorities.

Conditions of licence.

C.4.4 To review licence conditions to ensure their ongoing adequacy and with reference to internationally endorsed standards.

Since licensees were required to submit their radioactive waste management programmes and public protection programmes during the reporting period, the licence conditions pertaining to these programmes were reviewed. Although no revisions of the conditions were deemed necessary, a guidance document on radioactive waste management was discussed with, and provided to, licensees.

C.4.5 To review and revise the compliance assurance programme taking into consideration the safety indicators that will be developed during the reporting period.

The document explaining the basis for the compliance assurance programme was reviewed and revised to incorporate aspects such as the operational history of a facility and to provide for a more regular and formal review of the compliance assurance programme applicable to a facility.

C.4.6 To demonstrate that compliance with the dose limitation system for individual workers and members of the public has been achieved.

To date, hazard assessment reports covering approximately 97% of the underground workforce have been submitted to the CNS.

Based on the outcome of these assessments, licensees submitted their protection programmes for underground workers. In view of the cost associated with issuing personal radiation dosimeters to all underground workers, licensees have proposed various alternative strategies to estimate doses to workers making use of monitoring techniques in working areas. These proposals are presently under review for acceptability. This process will not delay implementation but will require any operational shortcomings identified to be subsequently rectified.

The doses received by workers during 1999 are as presented in Table 5. Working groups have been established at Harmony Gold Mine and Randfontein Estates Gold Mine where dose limits were exceeded in past years. The working groups consisted of representatives of management, labour and the CNS as well as consultants with specialist expertise. At Harmony Gold Mine the work of this group has led to a significant reduction in doses.

Dose intervals (mSv/a)	0-5	5-10	10-15	15-20	>20	Total
Number of Workers	129 483	32 811	14 685	3 606	5 427	186 012

Table 5: Radiation exposure to workers at authorised mining and minerals processing facilities for the year 1999

During the reporting period, radon progeny levels reduced by a factor of five at some points, while mitigation measures are being implemented to further reduce radiation levels at other points. The contribution at Randfontein Estates working group is expected to become obvious in the near future.

C.4.7 To ensure Y2K compliance where necessary.

The CNS required assurance that all licensees were Y2K compliant in respect of all the systems and instruments used to demonstrate compliance with licence conditions. No problems were experienced at the time of the change-over.

C.4.8 To ensure the development and implementation of a comprehensive waste management strategy.

Licensees submitted their radioactive waste management programmes that would, as a minimum, cover identification, quantification and classification of radioactive waste. The programmes are being reviewed with a view to ensuring that an adequate strategy is in place for the safe management of radioactive waste arising from the mining and minerals processing industries. More concentrated long lived wastes are currently stored pending development of a national policy on radioactive waste management which will identify future management options for these wastes. This will ensure that suitable disposal options are determined. In addition, bulk mine residues in the form of radioactive mine tailings and waste rock has to be managed in perpetuity due to the long radioactive half-lives associated with the radioactive nuclides concerned. Appropriate measures need to be put in place for the safe management of these wastes.

Concerning the release of scrap metal from licensed facilities, proposals regarding the import and export of scrap metal have been finalised and will be discussed with interested and affected parties in the near future.

C.4.9 To ensure the clean-up of all contaminated off mine sites associated with the mining and processing of radioactive minerals and ores.

Contaminated scrap material sites.

Of the forty contaminated off-mine sites, the SBI Plastics site was cleaned up. The radioactive waste arising from the clean-up was placed in a sealed container on the site. The waste has been shielded and a survey was also conducted to confirm that the contamination has been removed.

The way in which the waste from the clean-up activities is managed remained the major issue preventing further progress with these activities. In a further effort to resolve this deadlock, the CNS conducted an analysis of the advantages and disadvantages of the various waste management options and informed the mining industry of its concerns and requirements regarding options that they proposed. The mining industry has not responded to this information.

Abandoned testing sites.

Two sites were referred to the CNS which had been used for testing artillery shells made from depleted uranium. The testing process causes dispersion of the uranium in the soil target matrix and dispersion of the soil target itself, giving rise to widespread contamination of the local environment. The protocol for the cleanup and clearance of the Jakkalsfontein and Alkantpan operations has been submitted to the CNS for approval. The cleanup and clearance of the two sites is now entering the final phases of the project, which is scheduled to be complete in January 2001.

C.4.10 To develop and implement service standards applicable for regulatory review and control activities.

Service standards have been developed for internal review in respect of underground radiation protection programmes, programmes controlling public exposure and radioactive waste management.

C.4.11 To develop and implement a regulatory safety indicator monitoring system, in accordance with the CNS policy, against which the safety status of the activities can be measured.

No progress has been made in this area owing to the application of resources to other priorities. The matter will be taken up in the forthcoming year.

D. ADMINISTRATION AND CONTROL.

D.1 Personnel.

D.1.1 To ensure that the existing human resources of the CNS are maintained at an adequate level for its mission, objectives and workload through effective recruitment and selection.

The staff complement of the CNS was seventy-nine at the end of the reporting period. Four members of staff were recruited to fill vacant positions during the year, two Project Officers for the Mining and Minerals Pro-



Mr De Waal Weideman
Manager: Human Resource and Support Services

cessing department, one Project Officer for the AEC project and one Materials Integrity Specialist. A recruitment campaign will be launched to recruit six members of staff for the PBMR Project Department.

D.1.2 To implement the affirmative action policy at all levels of the organisation through purposeful recruitment, accelerated training, progression and promotion.

The target set for the 1999/2000 financial year has been exceeded. Representation figures at the end of the period were:

Total CNS Staff

Designated Group	46%
Non Designated Group	54%

Management

Designated Group	33%
Non Designated Group	67%

Priority attention is given to staff from the designated group when implementing the CNS staff development plan.

D.1.3 To develop an employment equity strategy and plan as part of the affirmative action initiatives.

The CNS Employment Equity Plan is being developed with the aid of a specialist in the field of labour relations and in consultation with the AA Monitoring Group and the Staff Association.

D.1.4 To implement a staff development programme through which individual training needs are identified and addressed, with specific emphasis on accelerated training for staff from the designated group.

Human Resource Development Programme

A human resource development programme was developed and implemented. The programme involved a systematic review of individual staff training and development needs enabling an organisation wide programme to be established. The programme covered professional development elements of scientific and technical training together with soft skills and management training where necessary. The programme fulfils all the requirements of the Employment Equity Act and the CNS Affirmative Action Policy.

The implementation of the human resource development programme progressed according to schedule. Training requirements were identified and were translated into formal staff development programmes for individual staff members. Priorities were determined with specific emphasis on accelerated training for staff from the designated group.

D.1.5 To identify internal CNS documents which are or have been affected by legislative changes, and amend the identified documents, such as AD's on Conditions of Service, Disciplinary Code, Grievance Procedure and the Recruitment Procedure.

A review procedure has been developed for CNS policy documents affected by legislative changes. The Recruitment and Grievance procedures have been finalised.

D.1.6 To investigate proposals through which financial assistance could be given to those members of staff participating in the CNS medical scheme, who joined the CNS on or after 1 July 1990 and who, at present, will not receive any financial assistance in this regard upon their retirement from the CNS.

At its meeting in November 1999, the Council for Nuclear Safety approved that financial assistance be extended to those members of staff joining the CNS between 1 July 1990 and 31 December 1995 and who retire from the service of the CNS. This will be applied on a sliding scale with the maximum benefit being 60% of subscription fees. No assistance will be extended at this time to those members of staff joining after 31 December 1995.

D.1.7 To develop and implement an induction course through which newly appointed members of staff would be introduced to the CNS.

It was decided that the development of the Induction course will be left in abeyance until the completion of the Management Directive and the Management manuals. It is envisaged that these documents will be completed by July 2000, whereafter attention will be given to the Induction course.

D.2 Administration and Information Technology

D.2.1 To ensure Y2K compliance through implement-

ing the CNS Y2K plan.

A systematic assessment was carried out and potential problem areas were addressed. The CNS experienced no problems with Y2K compliance of its computer systems.

D.2.2 To provide a sound computing basis and network for the CNS.

A systematic assessment of the CNS computer network was carried out and it was decided to re-configure all its servers and the entire network to provide a more stable working environment for computer operations. This exercise resulted in the more effective usage of hardware and software resources, resulting in a cost and time saving in the CNS's overall computer operations.

D.2.3 To investigate the feasibility and cost effectiveness of moving the CNS workflow system, document storage and retrieval system from the Lotus environment to the Microsoft environment.

An investigation was carried out to determine whether the CNS computer operating system will remain in the Lotus Notes environment or whether it would be advantageous to move to a Microsoft operating environment. It was decided to remain in the Lotus Notes environment, and to optimally use the system for improving the workflow and data storage and retrieval systems of the CNS. The latest version of Lotus Notes was implemented on the CNS computer system. This will enable the CNS to introduce further developments to the workflow and data storage and retrieval systems.

D.3 Finance

D.3.1 To ensure that the costs of the CNS are contained within acceptable limits that are identified through the budget.

The CNS developed improved reporting strategies to enable the departmental managers to have better information with which they can manage expenditure. Regular feedback on the status of the CNS income and expenditure estimates was given to the CNS Audit Committee and to the Council.

The CNS contained its expenditure within its approved budget.

D.3.2 To implement an effective internal audit programme.

KPMG was appointed as internal auditors and has conducted three internal audits during the last eighteen months. Regular feedback was given to Top Management and the Audit Committee. KPMG reported to the Audit Committee at its last meeting, that they were satisfied that the CNS had implemented all the required management controls, and that these were applied effectively by CNS management.

D.3.3 To implement a system of department based cost centres.

The CNS has implemented a department-based cost centre financial system. Financial reports are printed in this format and submitted to Departmental Managers on a monthly basis.

D.3.4 To maintain effectively the project bookkeeping programme.

The CNS has effectively maintained its separate project bookkeeping system.

D.3.5 To implement changes to the salary programme, resulting from the changes in the requirements of the SA Revenue Service.

The CNS has implemented all the new requirements laid down by SARS. The Internal Auditors have audited these new implementations and have indicated that they are satisfied with the implementation thereof.

DIRECTORS' REPORT 1999/2000

NATURE OF BUSINESS

The Council for Nuclear Safety (CNS) was established in terms of Section 33 of the Nuclear Energy Act, 1993 (Act No. 131 of 1993) to safeguard persons against nuclear damage by regulating and exercising control over –

a) the construction or use of a nuclear installation;
b) the use, possession, production, storage, processing, enriching, reprocessing, conveyance or disposal of radioactive material;
c) the discarding of radioactive waste;
d) the storage of irradiated nuclear fuel;
e) the carrying out of any other activity involving radioactive material, which is capable of causing nuclear damage.

In achieving its aim, the main technical functions of the CNS are to grant licences (or issue declarations) with attendant conditions for the above activities and to advise the Minister on any matter associated with these. In addition and with regard to the above activities, the CNS acts as the national competent authority in terms of the IAEA's Regulations for the Safe Transport of Radioactive Materials, collaborates with outside bodies to ensure that it has at its disposal an appropriate range of scientific and technical information for it to accomplish its tasks, and assists in the provision of a purposeful educational and training environment in matters of nuclear safety.

STATE OF AFFAIRS

CNS strategy is to implement responsible and effective regulatory control. It accomplishes this by adopting regulatory practices that are comparable internationally and which address the risk of nuclear damage through applying quantitative and qualitative assessment techniques and safety assurance programmes in a cost effective manner.

The activities of the CNS, aimed at the health and safety of South Africa's public, continued to be consistent with broad Government policy. In discharging its mandate the CNS continued to be receptive to considerations of transformation, capacity building, co-operative governance and effective financial control.

At year end the CNS had a total of 102 licensees (1999 : 95), covering the mining and minerals and nuclear energy sectors, and including incidental users of radioactive materials from the nuclear fuel cycle.

By continually conducting safety assessments, monitoring compliance with conditions of licence and inspecting activities on an ad hoc basis, the CNS has been able to ensure the introduction of appropriate measures to maintain safety margins and to provide assurance of nuclear safety nationwide.

OPERATING RESULTS AND FINANCIAL POSITION

The financial statements set out the operating results for the year. Income amounted to R32,61m (1999 : R32,529m). The contribution to expenditure by the State amounted to R5,62m (1999 : R5,8m) compared with the budgeted income of R30,632m (1999 : R30,171m). Expenditure amounted to R33,412m (1999 : R32,431m) compared with a budget of R30,181m (1999 : R29,844m). The figures for the 1999/2000 financial year are based on a period of eleven months only since the financial year was shortened as a result of the introduction of new legislation.

PREDETERMINED OBJECTIVES

INTRODUCTION

The objects of the CNS were defined in the governing Statute (Section 34 of the Nuclear Energy Act, No. 131 of 1993) and required the CNS to establish a licensing process to regulate and exercise control over a range of activities involving nuclear energy and materials with a view to safeguarding the public and workforce.

Accomplishment of the full mandate of the CNS required that a wide range of specific objectives were identified from year to year, with some of these continuing over several years. These have been formulated to facilitate, to the maximum extent possible, their review against performance considerations, on a quantitative and financial basis, bearing in mind the constraints imposed by the nature of business.

In order to present all these objectives in an equitable manner, their comprehensive listing, of some 110 in total, was approved by the Council at its meeting on 24 March 1999, for implementation during the financial year commencing 1 April 1999.

Full details of each objective, with a description of progress made, were submitted to the Auditor General and are appended hereto. A tabulated executive overview of the progress made in attaining these is given below.

NATURE OF BUSINESS

This report covers the period 1 April 1999 to 23 February 2000, the latter date being the date of commencement of the National Nuclear Regulator Act, 1999, which partially repealed the Nuclear Energy Act, 1993.

OBJECTIVES

A. LEGAL AND MANAGEMENT

A.1 National Policies

KEY PERFORMANCE AREAS

A.1.1 Provide input into establishment of National Radioactive Waste Management policy.

A.1.2 Monitor and provide input into national policy in respect of energy issues, in particular safety implications related to privatisation of the Generator.

A.1.3 Provide input into national policy on safety assessment of new technologies, especially the PBMR.

PERFORMANCE RESULTS

Made resources available to DME.

In progress, target date end 2000.

Input was provided to the technical and economic feasibility studies carried out by the IAEA on the PBMR at the request of the Minister of Minerals and Energy.

OBJECTIVES

A.2 LEGISLATION

KEY PERFORMANCE AREAS

A.2.1 Provide input in the promulgation of sound legislation.

Input provided to DME. Steering committee established to help with transition.

A.2.2 Review management manuals for consistency and adequacy.

A.2.3 Arrange a process of international peer review of the organisation and operation of the CNS.

PERFORMANCE RESULTS

An initial review took place. Date for completion July 2000.

Proposal supported by Council. Referred to new Board.

OBJECTIVES

A.3 COUNCIL AFFAIRS

KEY PERFORMANCE AREAS

A.3.1 Council for Nuclear Safety

A.3.1.1 To implement a formal capacity building programme for members of the Council.

A.3.1.2 To establish and implement a structured programme of work.

PERFORMANCE RESULTS

A programme of presentations and visits was agreed with the Council.

A programme was agreed with the Council.

OBJECTIVES

A.3.2 ADVISORY BODIES

KEY PERFORMANCE AREAS

A.3.2.1 To finalise arrangements and assist in initiating the work of the Advisory Committee on Radiation Safety (ACORS).

PERFORMANCE RESULTS

Government decided not to establish this body, but to rather expand representation on the NNR Board.

OBJECTIVES

A.4 MANAGEMENT AFFAIRS

A.4.1 Reporting by Public Entities Act

KEY PERFORMANCE AREAS

A.4.1.1 To monitor compliance with CNS approved objectives and report as required by the Act.

PERFORMANCE RESULTS

The objectives for the CNS were approved by the Council. Progress was monitored throughout the year.

OBJECTIVES

A.5 SUPPORTING ACTIVITIES

KEY PERFORMANCE AREAS

A.5.1 External Liaison A.5.1.1 To establish contact with Licensing Authorities overseas dealing with regulatory control over radiation hazards in the mining and processing of radioactive areas and minerals.

A.5.1.2 To develop contact with research reactor safe-

ty work currently being undertaken internationally.

A.5.1.3 To further develop liaison with institutions engaged in waste safety work of particular relevance to current projects.

A.5.1.4 To continue with the implementation of the guidelines for co-operation with DWAF.

A.5.1.5 To develop and implement Guidelines for Co-operation with the Mine Health and Safety Inspectorate (MHSI).

A.5.1.6 To develop and implement Guidelines for Co-operation with the Department of Environmental Affairs and Tourism (DEAT)

A.5.1.7 To maintain liaison and where necessary, establish more formal agreements with other relevant government departments regarding co-operative governance, e.g. Health, Labour

A.5.1.8 To develop an environmental management plan with DEAT.

A.5.1.9 To establish licensee liaison groups – workers and public for all licensees

A.5.1.10 To pursue the schools project with a view to repeating a similar project as undertaken in 1998 but if possible, with broader participation

A.5.1.11 To conduct a series of capacity building workshops in nuclear, radiation and waste related safety matters as agreed with stakeholders

A.5.1.12 To further develop public awareness/confidence information

A.5.1.13 To publish a periodic newsletter on the affairs of the CNS

A.5.1.14 To produce the Annual Report for 1998/99

A.5.1.15 To further develop and maintain a web page on NNR activities.

PERFORMANCE RESULTS

Contact was made with a number of countries. This resulted in the formation of the Southern Hemisphere Forum. A workshop is planned for the coming year. Australia, Brazil and some European countries were contacted.

Contact has been made with the Swedish nuclear regulator authority.

Contact has been maintained with a number of members of the Waste Safety Advisory Committee of the IAEA

The CNS and DWAF have had regular meetings in terms of a standing agreement for co-operation.

Proposals have been made to MHSI; awaiting response.

Several meetings took place between the CNS and DEAT, related mainly to the Environmental Impact Assessment (EIA) for the proposed PBMR project as required by the Environment Conservation Act.

Liaison was maintained.

Preliminary discussions took place; further discussions will take place after the promulgation of the new legislation.

Regular meetings were held with representatives of local authorities and organised labour from Koeberg. The CNS has been represented on the Pelindaba Communications Forum. Meetings were held with representatives of organised labour associated with mine licensees. Limited progress has been made with establishing formal liaison with the public associated with licensed mines.

Discussions took place with members of the high school science teaching fraternity with a view to launching another schools project during 2000.

A meeting was held with public interest groups in the Northern Cape. A workshop is planned for the first half of 2000.

A booklet was produced which provides questions and answers to workers who are occupationally exposed to radiation.

Limited progress was made.

The report was published.

Work has been carried out on a web page design.

OBJECTIVES

A.5.2 INTERNATIONAL CONVENTIONS

KEY PERFORMANCE AREAS

A.5.2.1 To encourage and promote signature and ratification of the waste convention

A.5.2.2. To establish a "trial run" on compiling a country report in respect of the waste convention to test compliance with its obligations

A.5.2.3 To present the country position on the Convention on Nuclear Safety at the international review meeting

PERFORMANCE RESULTS

Representations have been made to the Department of Minerals and Energy.

The convention secretariat finalised arrangements for reporting under the convention and proposals have been drawn up based on them for a "trial run" in the next year.

The South African national report was presented at a

review meeting of contracting parties to the Convention.

OBJECTIVES

A.5.3 INTERNATIONAL PARTICIPATION

KEY PERFORMANCE AREAS

A.5.3.1 To optimise the strategy for maintaining involvement with international nuclear, radiation and waste safety matters

A.5.3.2 To review participation in international research initiatives

A.5.3.3 To maintain liaison with overseas national nuclear regulatory authorities

PERFORMANCE RESULTS

A system was established to review all meetings held internationally on nuclear safety and identify those of most interest to the CNS.

Consideration will be given at the end of the review period to the cost effectiveness of continued involvement in USNRC sponsored research activities.

A number of staff maintained contact with, and visited the regulatory authorities of France, Belgium, USA and the UK.

OBJECTIVES

A.5.4 Transport of Radioactive Materials

A.5.4.1 To review the obligations of the NNR in its capacity as the national competent authority in respect of the IAEA Transport Regulations

KEY PERFORMANCE AREAS

A.5.4.2 To assist the DOH and SAPS to investigate the extent of illicit trafficking of radioactive materials within the country and determine a course of action to be taken in co-operation with the DOH and the SAPS

KEY PERFORMANCE AREAS

Progress has been made with this matter.

Work commenced on the preparation of an information document on this matter. Meetings have been planned with the SAPS and DOH to discuss illegal trafficking of radioactive materials.

OBJECTIVES

A.5.5 NATIONAL CAPACITY BUILDING

KEY PERFORMANCE AREAS

A.5.5.1 To continue the provision of assistance to the MARST course at the University of North West.

A.5.5.2 To continue the provision of assistance to the International Atomic Energy Agency sponsored postgraduate course in radiation safety at the University of the Witwatersrand.

PERFORMANCE RESULTS

The CNS has continued its support to the University of North West with its involvement in the MSc course in Applied Radiation Science.

The course for 1999 was successfully presented. The course will again be presented in 2000.

OBJECTIVES

B1. SAFETY STANDARDS

B.1.1 To review the Standards Programme and revise, as necessary, and to obtain formal approval from the Council.

KEY PERFORMANCE AREAS

B.1.2 To review the fundamental safety standards for adequacy and compatibility with international norms.

B.1.3 To review the basis for emergency planning and preparedness standards and revise as necessary with a view to ensuring adequacy and compatibility with international norms. This will include the basis for emergency planning.

B.1.4 To document formally the nuclear, radiation and waste safety standards and the regulatory practice adopted for the PBMR project and to make them available for broad review and comment from interested and affected parties.

B.1.5 To formalise and subject to review and approval waste management standards concerning decommissioning and demolition.

B.1.6 To review and revise as necessary the scheduling of safety standards development applicable to the mining and processing of radioactive ores and minerals.

B.1.7 To develop a guideline on Software Quality Assurance

PERFORMANCE RESULTS

Proposals have been drawn up for consideration by the new board of the NNR.

Work has commenced.

The requirements have been drawn up in the form of a licence guide.

These will be addressed in the overall standards programme.

The standards have been discussed with the mining industry and a programme of development drawn up.

A licence guide has been drafted.

OBJECTIVES

B.2 REGULATORY TOOLS

KEY PERFORMANCE AREAS

B.2.1 To formalise and implement a standardised approach to root cause analysis within the CNS.

B.2.2 To develop a methodology for determination of safety indicators and adopt its use throughout the CNS.

B.2.3 To review, revise and formalise CNS policy on exemption and the determination of hazard or risk based licence conditions.

PERFORMANCE RESULTS

Work has commenced and will continue into the next year.

A position paper has been drawn up and is under review.

A draft has been prepared and international developments are being monitored.

OBJECTIVES

B.3 INFORMATION FEEDBACK

KEY PERFORMANCE AREAS

B.3.1 To implement the recently developed information dissemination process

PERFORMANCE RESULTS

A database has been established and is updated on a regular basis.

OBJECTIVES

C.1 NUCLEAR POWER REACTORS

C.1.1 KNPS

C.1.1.1 Safety Assessment

KEY PERFORMANCE AREAS

C.1.1.1.1 To finalise review of Eskom's Koeberg Safety Re-assessment (SRA) Report and document CNS findings

C.1.1.1.2 To agree and finalise, with Eskom, an implementation plan of identified corrective actions for safety improvements.

C.1.1.1.3 To finalise assessment of the international review of Koeberg emergency preparedness arrangements (SAIC findings) in order to resolve the issues of demographics around the Koeberg Nuclear Power Station.

C.1.1.1.4 To complete the review of licensee safety assessments in support of specific requests for licence change requests or modifications, within acceptable timeframes and service standards.

C.1.1.1.5 To finalise and implement the CNS licensing guide on safety cases submitted by the licensee as well as the CNS licensing guide review plan to be used by CNS assessors.

C.1.1.1.6 To develop the CNS regulatory PRA as a more dynamic assessment tool, e.g Risk Spectrum.

C.1.1.1.7 To establish defined proactive work programmes.

PERFORMANCE RESULTS

The re-assessment review was finalised and documented.

A plan has been established and agreed.

Progress has been made towards finalisation; the work will be completed in the next year.

The reviews of safety assessments were completed within acceptable timeframes.

The guide was compiled and is under review.

Limited progress was made.

Considerable progress was made.

OBJECTIVES

C.1.1.2 Conditions of Licence

C.1.1.3 Compliance Assurance

KEY PERFORMANCE AREAS

C.1.1.2.1 To undertake a review of the Koeberg conditions of licence. Various licence change requests were reviewed and approved.

C.1.1.3. To ensure compliance with the dose limitation system for individual workers and members of

the public.

C.1.1.3.2 To implement a risk focussed compliance inspection programme at KNPS.

C.1.1.3.3 To implement a monitoring programme to assess the effectiveness of the Eskom Nuclear Governance Organisation (Generation Safety and Assurance –GS&A.

C.1.1.3.4 To implement a regulatory process to ensure that Eskom has addressed Y2K compliance issues on the Koeberg plant.

C.1.1.3.5 To develop and implement a regulatory safety indicator monitoring system, in accordance with the CNS policy, against which the nuclear safety status of the Koeberg NPS can be measured. In this process, reference will be made to the outcome of the Convention on Nuclear Safety review meeting held in April 1999.

PERFORMANCE RESULTS

Radiation doses to workers and members of the public were well within limits.

The independent CNS safety indicator system for monitoring the status of nuclear safety at the KNPS was finalised and established on an electronic database.

The CNS required a number of audits to be incorporated into the Koeberg Integrated Monitoring Programme and participated in four audits related to the activities of the GS&A organisation.

The process was established and successfully implemented.

The system was established and implemented.

OBJECTIVES

C.1.2 PBMR

C.1.2.1 Safety Assessment

C.1.2.2 Conditions of Licence

C.1.2.3 Compliance Assurance

KEY PERFORMANCE AREAS

C.1.2.1.1 To conclude the programme of work necessary to come to a decision on the licensibility of the PBMR conceptual design and formulate the necessary conditions for the granting of a first stage PBMR licence.

C.1.2.2.1 To formulate conditions of licence indicating the requirements which will have to be met should the project develop further than a conceptual design, following completion of the "Safety Assessment" phase.

C.1.2.3.1 To ensure that all quality assurance requirements for pre-licensing activities are fulfilled.

PERFORMANCE RESULTS

A programme of work has been established and will continue into the next year.

The safety assessment phase continued.

Quality assurance arrangements received continuous attention and the development and progress were reviewed.

OBJECTIVES

C.2 RADIOACTIVE WASTE MANAGEMENT

KEY PERFORMANCE AREAS

C.2.1 To review waste acceptance criteria for all licensed storage and disposal facilities for adequacy.

C.2.2 To initiate moves that will ensure that the rehabilitation of any contaminated sites not yet being addressed takes place.

C.2.3 To pursue recommendations arising from the IAEA peer review in respect of safety assessment.

C.2.4 To review conditions of licence for adequacy and appropriateness with particular reference to acceptance criteria, compliance with acceptance criteria and safety assessment.

C.2.5 To ensure compliance with the dose limitation system for individual workers and members of the public.

C.2.6 To determine adequacy of the Y2K programme.

C.2.7 To develop and implement service standards applicable for regulatory review and control activities.

C.2.8 To develop and implement a regulatory safety indicator monitoring system, in accordance with the CNS methodology, against which the safety status of the activities can be measured.

PERFORMANCE RESULTS

Criteria were reviewed, next revision of criteria is awaited.

Limited progress due to delays by the mining industry.

The AEC is making progress in this matter.

Review carried out.

Compliance was achieved.

Programme was adequate.

Preparation of service standard for the evaluation of safety reports was initiated.

The development of a basic set of indicators approached completion.

OBJECTIVES

C.3 NUCLEAR TECHNOLOGY

KEY PERFORMANCE AREAS

C.3.1 Atomic Energy Corporation – Pelindaba Site

C.3.1.1 To undertake licensing of all activities covered by the Nuclear Energy Act.

C.3.1.2 To progress the Safari safety review with a view to completion in the year 2000.

C.3.1.3 To undertake an assessment of the impact of chemical plants on nuclear safety.

C.3.1.4 To undertake a review of licence conditions to ensure ongoing adequacy with particular reference to internationally endorsed standards.

C.3.1.5 To review and revise the compliance assurance programme taking into consideration the safety indicators that will be developed during the reporting period.

C.3.1.6 To demonstrate that compliance with the dose limitation system for individual workers and members of the public has been achieved.

C.3.1.7 To review the environmental monitoring programme for ongoing adequacy and appropriateness.

C.3.1.8 To demonstrate the adequacy of emergency planning arrangements.

C.3.1.9 To assure progress in respect of the various decommissioning and decontamination programmes.

C.3.1.10 To determine the adequacy of the Y2K programme.

C.3.1.11 To evaluate the adequacy of the waste management plan.

C.3.1.12 To develop and implement service standards applicable for regulatory review and control activities.

C.3.1.13 To develop and implement a regulatory safety indicator monitoring system, in accordance with the CNS policy, against which the safety status of the activities can be measured.

PERFORMANCE RESULTS

Significant progress has been made.

The planned progress was made.

The AEC continued with the process of undertaking such an assessment.

The review was carried out.

The review and revision was carried out.

Compliance with the dose limitation system was demonstrated by the AEC. Some aspects remain under review.

The review was carried out and arrangements found to be adequate and appropriate.

Achieved according to plan.

Progress was made as planned.

The adequacy was determined.

A standing AEC-CNS review mechanism was established to evaluate progress.

Development of a service standard for the evaluation of safety reports was progressed.

The development of a basic set of indicators approached completion.

OBJECTIVES

C.4 MINING AND MINERALS PROCESSING

KEY PERFORMANCE AREAS

C.4.1 To progress licensing of all activities covered by the Nuclear Energy Act.

C.4.2 To finalise assessment of radiation hazards to the public from mining and minerals processing activities and to establish appropriate control and monitoring programmes.

C.4.3 To review the current hazard/risk assessment methodologies for different types of facilities in the light of international experience and to ensure consistency with CNS policy.

C.4.4 To review licence conditions to ensure their ongoing adequacy and with reference to internationally endorsed standards.

C.4.5 To review and revise the compliance assurance programme taking into consideration the safety indicators that will be developed during the reporting period.

C.4.6 To demonstrate that compliance with the dose limitation system for individual workers and

members of the public has been achieved.

C.4.7 To ensure Y2K compliance where necessary.

C.4.8 To ensure the development and implementation of a comprehensive waste management strategy.

C.4.9 To ensure the clean-up of all contaminated off-mine sites associated with mining and processing of radioactive minerals and ores.

C.4.10 To develop and implement service standards applicable for regulatory review and control activities.

C.4.11 To develop and implement a regulatory safety indicator monitoring system, in accordance with the CNS policy, against which the safety status of the activities can be measured.

PERFORMANCE RESULTS

Significant progress was achieved.

First revision assessments finalised; control programmes remained outstanding.

No progress has been made.

The review was carried out successfully.

The review was undertaken.

Not achieved – dose limits for workers are being exceeded.

Achieved.

Licensees submitted their waste management programmes and their review continued.

Not achieved – see C.2.2

Achieved as planned.

No progress has been made.

OBJECTIVES

D.1 PERSONNEL

KEY PERFORMANCE AREAS

D.1.1 To ensure that the existing human resources of the CNS are maintained at an adequate level for its mission, objectives and workload through effective recruitment and selection.

D.1.2 To implement the affirmative action policy at all levels of the organisation through purposeful recruitment accelerated training, progression and promotion.

D.1.3 To develop an employment equity strategy and plan as part of the affirmative action initiatives.

D.1.4 To implement a staff development programme through which individual training needs are identified and addressed, with specific emphasis on accelerated training for staff from the designated group.

D.1.5 To identify internal CNS documents which are or have been affected by legislative changes, and amend the identified documents, such as AD's on Conditions of Service, Disciplinary Code, Grievance Procedure and the Recruitment Procedure.

D.1.6 To investigate proposals through which financial assistance could be given to those members of staff participating in the CNS medical scheme, who joined the CNS on or after 1 July 1990 and who, at present, will not receive any financial assistance upon their retirement from the CNS.

D.1.7 To develop and implement an induction course through which newly appointed members of staff would be introduced to the CNS.

PERFORMANCE RESULTS

The staff complement was maintained at an adequate level.

The targets set for 1999/2000 were exceeded.

Development of the CNS employment equity plan continued; it will be submitted to the Department before December 2000.

A human resource development programme was developed and implemented successfully.

All CNS procedures which were affected by legislative changes have been identified and scheduled for amendment.

The investigation had been completed and the proposals implemented.

Deferred to the second half of 2000.

OBJECTIVES

D.2 ADMINISTRATION AND INFORMATION TECHNOLOGY

KEY PERFORMANCE AREAS

D.2.1 To ensure Y2K compliance through implementing the CNS Y2K plan.

D.2.2 To provide a sound computing basis and network for the CNS.

D.2.3 To investigate the feasibility and cost effectiveness of moving the CNS workflow system, document storage and retrieval system from the Lotus environment to the Microsoft environment.

PERFORMANCE RESULTS

The CNS experienced no problems with Y2K compliance.

A systematic assessment of the CNS computer network was carried out. This resulted in a re-configuration of the network.

The investigation was completed and it was decided to remain in the Lotus Notes environment.

OBJECTIVES

D.3 FINANCE

KEY PERFORMANCE AREAS

D.3.1 To ensure that the costs of the CNS are contained within acceptable limits that are identified through the budget.

D.3.2 To implement an effective internal audit programme.

D.3.3 To implement a system of department based cost centres.

D.3.4 To maintain effectively the project bookkeeping programme.

D.3.5 To implement changes to the salary programme, resulting from the changes in the requirements of the SA Revenue Service.

PERFORMANCE RESULTS

Costs were contained within the limits that were identified through the budget.

Three internal audits were conducted during the year and the results were reported to the Audit Committee.

A system of department based cost centres was implemented successfully.

The CNS has effectively maintained its project bookkeeping system.

The CNS has successfully implemented the new requirements laid down by SARS.

GOVERNANCE

1. The Directors are responsible for preparing financial statements that fairly represent the state of affairs of the company as at the end of the financial year and the net income or loss for that period.
2. The independent external auditor is responsible for reporting on the financial statements.
3. Adequate and appropriate accounting records and an effective system of internal control have been maintained.
4. Appropriate accounting policies, supported by reasonable and prudent judgements and estimates, have been applied on a consistent basis.
5. Applicable accounting standards have been adhered to. Departures in the interests of fair presentation have been disclosed, explained and quantified.
6. The Directors have no reason to believe that the business will not be a going concern in the year ahead.
7. The economic, efficient and effective application of resources is being monitored by Management through the application of internal control mechanisms.

REPORT OF THE AUDITOR-GENERAL

ON THE FINANCIAL STATEMENTS OF THE COUNCIL FOR NUCLEAR SAFETY FOR THE PERIOD 1 APRIL 1999 TO 23 FEBRUARY 2000

1. Audit Assignment

The financial statements as set out on pages 57 to 62, for the period 1 April 1999 to 23 February 2000, have been audited in terms of section 188 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996), read with sections 3 and 5 of the Auditor-General Act, 1995 (Act No. 12 of 1995), and section 49(4) of the Nuclear Energy Act, 1993 (Act No. 131 of 1993). These financial statements, the maintenance of effective control measures and compliance with relevant laws and regulations are the responsibility of the council's executive officer. My responsibility is to express an opinion on these financial statements and the compliance with relevant laws and regulations, applicable to financial matters, based on the audit.

2. Regularity Audit

2.1 Nature and Scope

2.1.1 Financial audit

The audit was conducted in accordance with generally accepted government auditing standards, which incorporate generally accepted standards. These standards require the audit to be planned and performed to obtain reasonable assurance that the financial statements are free of material misstatement. The audit was also planned and performed to obtain reasonable assurance that, in all material respects, the relevant requirements of the Reporting by Public Entities Act, 1992 (Act No. 93 of 1992), as amended, have been complied with.

An audit includes:

- examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements;
- assessing the accounting principles used and significant estimates made by management; and
- evaluating the overall financial statement presentation.

I believe that the audit provides a reasonable basis for my opinion.

2.1.2 Compliance audit

Furthermore, an audit includes an examination, on a test basis, of evidence supporting compliance in all material respects with the relevant laws and regulations, which came to my attention and are applicable to financial matters. I believe that the audit provides a reasonable basis for my opinion.

2.2 Qualification

2.2.1 Financial audit

Fixed assets

Sufficient audit assurance could not be obtained in respect of the completeness, existence and proper amount of fixed assets, as disclosed in the financial statements. The following deficiencies were identified, and had not been resolved as at the date of compiling this report:

- Descriptions in the fixed asset register were not sufficient to facilitate the physical identification of assets.
- Fixed assets as recorded in the asset register could not be verified, due to an insufficient audit trail between the location of the asset and the register.

Negative cost prices were identified, which resulted in negative book values being included in the fixed asset register.

2.2.2 Compliance audit

Reporting by Public Entities Act

In general, the directors' report contains the information as required by section 7 of the Reporting by Public Entities Act, 1992. However, the report lacks the following:

- Articulated performance information in measurable terms in order to determine the extent of the achievement of predetermined objectives.
- The objectives and relevant performance information regarding the economic, efficient and effective application of resources.

During the year under review, the Council took steps to establish the necessary information systems in order to report more comprehensively in future.

2.3 Qualified audit opinion

2.3.1 Financial audit

In my opinion:

- except for the matter discussed in paragraph 2.2.1 above, the financial statements fairly present, in all material respects, the financial position of the Council for Nuclear Safety for the period 1 April 1999 to 23 February 2000 and the results of its operations and cash flows for the period then ended in accordance with generally accepted accounting practice in the manner required by schedule 4 of the Companies Act, 1973 (Act No. 61 of 1973), and other reporting requirements as set out in the Reporting by Public Entities Act, 1992, as amended, and the regulations thereto;
- the information furnished in terms of sections 6 and 7 of the Reporting by Public Entities Act, 1992, is fair in all material respects and, where applicable, on a basis consistent with that of the preceding year; and
- the transactions that came to my attention during the audit were, in all material respects, carried out in accordance with the mandatory functions of the Council as determined by law or otherwise.

2.3.2 Compliance audit

Based on the audit work performed, except for the matters included in paragraph 2.2.2, nothing has come to my attention that causes me to believe that material non-compliance with laws and regulations, applicable to financial matters, has occurred.

3. Appreciation

The assistance rendered by the staff of the Council during the audit is sincerely appreciated.

JS Bosch
for Auditor-General
Pretoria
17/11/00

BALANCE SHEET AS AT 23-02-2000

STATEMENT 1

	Notes	1999-2000 Period ended 23-02-2000 R	1998-1999 Year ended 31-03-1999 R
Assets			
Fixed assets	3	2,269,892	2,037,795
Current assets		15,996,332	13,754,434
Accounts receivable	4	6,384,556	4,109,293
Payments made in advance		658,957	579,216
"Deposits and immediately claimable amounts		2,000	2,000
Bank balance and cash		8,950,819	9,063,925
		18,266,224	15,792,229
Equity and liabilities			
Income funds		3,453,666	13,300,428
Current liabilities		14,812,558	2,491,801
Accounts payable		5,073,558	2,491,801
Provisions	5	9,739,000	0
		18,266,224	15,792,229

CENTURION 2000-08-31

J LEAVER
Acting Executive Officer

K BHARUTH-RAM
Acting Chairperson

INCOME STATEMENT FOR THE PERIOD ENDED 23-02-2000

STATEMENT 2

	Notes	1999-2000 Period ended 23-02-2000 R	1998-1999 Year ended 31-03-1999 R
Income funds - beginning of the period		13,300,428	13,202,278
Operating (deficit) / surplus	6	(107,762)	98,150
Income received		33,610,357	32,529,573
State contribution	7.1	5,620,000	5,800,000
Licensing fees	7.2	23,123,421	21,093,347
Other projects	7.3	3,869,509	4,175,611
Interest	7.4	967,304	1,460,615
Sundries	7.5	30,123	0
Less: Expenditure		33,718,119	32,431,423
Personnel expenses	8.1	20,731,702	21,603,383
Subsistence & transport expenses	8.2	2,118,320	2,238,262
General expenses	8.3	6,004,591	3,993,499
Running expenses	8.4	3,288,327	3,177,040
Sundries	8.5	1,575,179	1,419,239
Income funds - end of the period		13,192,666	13,300,428

STATEMENT OF CHANGES IN EQUITY FOR THE PERIOD ENDED 23-02-2000

	Income funds
Balance at 31-03-1998	13,202,278
Net surplus for the period	98,150
Balance at 31-03-1999	13,300,428
Net deficit for the period	(107,762)
	13,192,666
Effect of change in acounting policy (refer to note 11)	(9,739,000)
Balance at 23-02-2000	3,453,666

CASH FLOW STATEMENT FOR THE PERIOD ENDED 23-02-2000

STATEMENT 3

	Notes	1999-2000 Period ended 23-02-2000	1998-1999 Year ended 31-03-1999
		R	R
Cash flows from operating activities		**989,200**	1,459,784
Cash generated / (utilised) by operations	**A**	**21,896**	(831)
Interest received		**967,304**	1,460,615
Cash outflow from investment activities		**(1,102,306)**	(1,010,159)
Acquisition of fixed assets	**B**	**(1,102,610)**	(1,028,203)
Proceeds on disposal of obsolete assets	**C**	**304**	**18,044**
Net (decrease) / increase in cash and cash equivalents		**(113,106)**	449,625
Cash and cash equivalentsat beginning of the period	**D**	**9,065,925**	8,616,300
Cash and cash equivalents at end of the period	**E**	**8,952,819**	9,065,925

NOTES TO THE CASH FLOW STATEMENT

Schedule A

	1999-2000 Period ended 23-02-2000	1998-1999 Year ended 31-03-1999
	R	R
A Cash generated / (utilised) by operations	**21,896**	(831)
Operating (deficit) / surplus	**(107,762)**	98,150
Adjustment for :		
Depreciation	**869,322**	790,246
Interest received	**(967,304)**	(1,460,615)
Net loss on disposal of obsolete assets	**887**	105,252
Working capital changes	**226,753**	466,136
(Increase) / Decrease in accounts receivable	**(2,275,263)**	658,471
(Increase) in payments made in advance	**(79,741)**	(503,158)
Increase in accounts payable	**2,581,757**	310,823
B Acquisition of fixed assets	**(1,102,610)**	(1,028,203)
Office furniture	**(46,483)**	(157,339)
Office equipment	**(274,149)**	(69,632)
Scientific and technical equipment	**(106,010)**	(79,656)
Computer equipment	**(675,968)**	(721,576)
C Proceeds on disposal of obsolete assets	**304**	18,044
Loss on disposal	**(887)**	(105,252)
Book value of assets disposed of :	**1,191**	123,296
a) Cost	**95,673**	519,139
b) Accumulated depreciation	**(94,482)**	(395,843)
D Cash and cash equivalents at beginning of the period	**9,065,925**	8,616,300
Bank balance and cash	**9,063,925**	8,614,300
Deposits and immediately claimable amounts	**2,000**	2,000
E Cash and cash equivalents at the end of the period	**8,952,819**	9,065,925
Bank balance and cash	**8,950,819**	9,063,925
Deposits and immediately claimable amounts	**2,000**	2,000

NOTES TO THE FINANCIAL STATEMENTS

Schedule B

1 Change of name

The National Nuclear Regulator Act (Act 47 of 1999) came into effect on the 24th of February 2000 and resulted in the name of the Council for Nuclear Safety being changed to the National Nuclear Regulator. The National Nuclear Regulator Act makes provision for the first financial year of the Regulator to commence on the date of promulgation on 24 February 2000 until 31 March 2001. This resulted in the financial year 1999/2000 being shortened whilst the 2000/2001 financial year will be longer than 12 months. The financial year 2001/2002 will again commence on 1 April 2001 and will end on 31 March 2002.

2 Accounting policy

The financial statements are prepared on the historical cost basis. The principal policies applied are set out below, and are consistent with those applied in the previous year, except as indicated in note 11.

2.1 Income

Income is recognised on the accrual basis.

2.2 State contributions received

State contributions are accounted for in the period with which the allocation is associated.

2.3 Fixed assets and depreciation

Fixed assets are shown at cost less accumulated depreciation and are written off over the expected useful life according to the straight line method. Expected useful lives are:

10 years for furniture,
5 years for office equipment,
5 years for scientific and technical equipment,
3 years for computer equipment.

The property is considered to be an investment property and accordingly is not depreciated. The present value is estimated at R 427,500.

2.4 Expenditure for research and development

Expenditure for research and development is written off in the Income Statement in the year in which it was incurred.

2.5 Leased assets

Operating lease rentals are charged against income as incurred.

2.6 Provisions

Provisions are recognised when the CNS has a present legal or constructive obligation as a result of past events, for which it is probable that an outflow of economic benefits will be required to settle the obligation, and a reliable estimate can be made of the amount of the obligation. Where the effect of discounting to present value is material, provisions are adjusted to reflect the time value of money.

2.7 Retirement benefits

2.7.1 Retirement funds

The CNS provides a defined benefit fund for the benefit of employees. Current contributions to this fund are charged against income when incurred. Past service costs, if applicable, to defined benefit funds for existing employees are recognised as an expense over the remaining working lives of the employees concerned. All other past service costs are charged against income as incurred. Retirement benefit costs in the defined benefit fund are determined and expensed using the accrued benefit valuation method that recognises the expected costs of providing benefits over the period during which the CNS benefits from the employees' services. This method determines the cost of providing retirement benefits on the basis of services rendered by employees to the date of the actuarial valuation.

2.7.2 Medical funds

Medical aid costs are recognised as an expense in the period during which the employees render services to the CNS. Future costs of benefits relating to certain early retirements are provided for from date of retire-

ment. The present value of future medical aid costs for such early retirements is actuarially determined every three years on the basis of current actuarial practice, and any shortfalls or surpluses are recognised in the income statement. (Also see note 11.)

3 Fixed assets

	1999-2000 Period ended 23-02-2000 R		1998-1999 Year ended 31-03-1999 R	
Book value at beginning of period	2,037,795		1,923,134	
Purchases	1,102,610	*	1,028,203	*
Disposal	(1,191)	*	(123,296)	*
Depreciation	(869,322)		(790,246)	
Book value at end of period	2,269,892		2,037,795	

* Includes Y2K expenditure (see note 9).

Refer to shedule C

4 Accounts receivable

	1999-2000 Period ended 23-02-2000 R	1998-1999 Year ended 31-03-1999 R
Trade debtors	6,573,854	3,974,467
Less: Provision for doubtful debts	(403,600)	(289,500)
Net trade debtors	6,170,254	3,684,967
Other debtors	214,302	424,326
	6,384,556	4,109,293

5 Provisions

	Post-retirement medical benefits R	Total R
Balance at 31-03-1998	0	0
Provions raised at end of the period following change in accounting policy. (Refer to note 11)	9,739,000	9,739,000
Balance at 23-02-2000	9,739,000	9,739,000

NOTES TO THE FINANCIAL STATEMENTS

Schedule B (continued)

6 Operating (deficit) / surplus

	Notes	1999-2000 Period ended 23-02-2000 R	1998-1999 Year ended 31-03-1999 R
Income	7	33,610,357	32,529,573
Less: Expenditure	8	(33,718,119)	(32,431,423)
		(107,762)	98,150

7 Income

	1999-2000 Period ended 23-02-2000 R	1998-1999 Year ended 31-03-1999 R
7.1 Contributions received	5,620,000	5,800,000
State Contribution	5,620,000	5,800,000
7.2 Licensing fees	23,123,421	21,093,347
AEC projects	2,933,333	3,700,000
Eskom - PBMR Project	3,567,743	0
Eskom - KNPS projects	13,509,984	14,066,147
Other licensees	3,112,361	3,327,200
7.3 Other projects	3,869,509	4,175,611
Fees levied - Eskom's PBMR project	3,869,509	4,175,611
7.4 Interest earned	967,304	1,460,615
Attorney trust	0	14,567
Bank account	967,304	1,446,048
7.5 Sundries	30,123	0
	33,610,357	32,529,573

8 Expenditure

		Notes	1999-2000 Period ended 23-02-2000 R		1998-1999 Year ended 31-03-1999 R	
8.1	**Personnel expenses**		**20,731,702**		21,603,383	
	Bursars	10.1	**155,516**		297,926	
	Post retirement benefits	10.2	**222,870**		1,183,658	
	Recruitment costs		**2,032**		78,368	
	Remuneration to Board Members		**97,283**		139,742	
	Salaries, allowances and annual payments	10.2	**19,705,070**		19,330,929	
	Training		**416,868**		444,275	
	Incidental personnel expenses		**52,063**		128,485	
8.2	**Subsistence and traveling expenses**		**2,118,320**		2,238,262	
	Re-establishment costs		**88,442**		185,390	
	Subsistence and Traveling		**2,014,327**		2,033,270	
	Incidental S & T expenses		**15,551**		19,602	
8.3	**General expenses**		**6,004,591**		3,993,499	
	Audit fees	10.4	**170,654**		199,530	
	Communication services		**527,967**		487,269	*
	Insurance		**83,591**		80,441	
	Library items		**75,646**		78,569	
	Regional services, taxes and levies	10.5	**(122,039)**		538,069	
	Stationery and printing		**203,225**		193,808	
	Specialised services	10.3	**4,784,165**	*	2,124,323	*
	Incidental general expenses		**281,382**		291,490	
8.4	**Running expenditure**		**3,288,327**		3,177,040	
	Accommodation (Rent & services)		**1,106,833**		1,168,771	
	Computer software		**381,691**	*	119,450	*
	Consumable stores		**210,844**		186,233	
	Operating leases		**203,248**		218,306	
	Research contracts		**627,757**		557,152	
	Service contracts and maintenance		**693,027**	*	888,551	*
	Incidental running expenses		**64,927**		38,577	
8.5	**Sundries**		**1,575,179**		1,419,239	
	Bad debts written off as irrecoverable		**0**		128,741	
	Depreciation on assets		**869,322**		790,246	
	Disposal of obsolete assets		**887**	*	105,252	*
	Provision for:		**704,970**		395,000	
	Accumulated leave (Staff)		**317,600**		205,500	
	Doubtful debtors		**114,100**		189,500	
	Annual bonuses (Staff)		**273,270**		0	
	Total expenditure		**33,718,119**		32,431,423	

* Includes Y2K expenditure (see note 9).

9 Y2K expenditure.

Footnote * to notes 3 and 8 refers. The following expenses were made in respect of Y2K compliance:

	Notes	1999-2000 Period ended 23-02-2000 R	1998-1999 Year ended 31-03-1999 R
Consultancy	8.3	62,548	174,750
Communication services	8.3	35,369	3,149
Computer software	8.4	335,020	33,100
Service contracts and maintenance	8.4	236,979	205,178
Disposals of obsolete assets	8.5	583	31,045
Fixed assets: Computer equipment	3	633,403	586,466
		1,303,902	1,033,688

10 Expenditure

10.1 Personnel expenses: Bursars.

Payments to Universities in respect of the CNS Bursars.

10.2 Personnel expenses: Post retirement benefits.

Contributions

The CNS made the following contributions to the Medical Scheme and Pension Fund:

	Notes	1999-2000 Period ended 23-02-2000 R	1998-1999 Year ended 31-03-1999 R
		3,557,073	4,420,075
Medical aid	10.2.1	1,251,932	1,251,588
Pensioner members		222,870	232,308
Working members		1,029,062	1,019,280
Retirement fund	10.2.2	2,305,141	3,168,487
Pensioner members		0	951,350
Working members		2,305,141	2,217,137

10.2.1 Medical Scheme

The CNS has a commitment to pay the monthly subscriptions to the medical scheme in respect of staff members who were in its employ on or before 1 July 1990 and who retire from its service. It also has a commitment to pay a portion of the subscription to the medical scheme in respect of those members of staff who joined the CNS between 1 July 1990 and 31 December 1995 and who retire from its service. At the end of the reporting period the full medical subscriptions were in respect of 19 pensioners. 42 staff members who are still in the CNS employ will qualify for post retirement benefits when they retire. The CNS has no liability towards members of staff who joined after 31 December 1995 and who retire from its service.

10.2.2 Retirement Fund

All employees are members of the CNS Retirement Fund, a Defined Benefit Fund governed by the Pension Funds Act of 1956. The Fund was established on 1 December 1994 following withdrawal by the CNS from the Associated Institutions Pension Fund. A full actuarial valuation of the Fund was conducted in July 1997 and it was found that the funding level was 91,3%. The employer agreed to fund the actuarial shortfall over a period of three years. An actuarial valuation will again be conducted within the prescribed period of three years from the date of the previous valuation.

10.3 General expenses: Specialised services.

The increase in expenditure in Consultancy fees is ascribed to the following:

(a) The CNS resumed its contract with the US Nuclear Regulatory Commission resulting in an expenditure of US$ 90 000.00.

(b) The CNS contracted overseas consultancy firms to assist it in technical assessment relating to the Pebble Bed Modular Reactor project. These expenses are recovered fully from Eskom.

10.4 General expenses: Audit fees.

The CNS contracted out its internal audit function to an independent auditing firm.

	Notes	1999-2000 Period ended 23-02-2000 R	1998-1999 Year ended 31-03-1999 R
Audit fees	10.4.1	170,654	199,530
Provision		150,000	103,000
Under/(over) Provision previous year		20,654	96,530
10.4.1 Audit fees		170,654	199,530
External audit cost		85,810	116,305
Internal audit cost		84,844	83,225
Audit fees		72,750	34,250
Taxation services		4,275	10,901
Other services		6,665	35,500
Disbursements		1,154	2,574

10.5 General expenses: Regional services, taxes and levies.

It was established that the CNS, at the time of its inception in 1988, was incorrectly registered by the Greater Pretoria Metropolitan Council to pay only the Regional Services Levy whereas it was liable to pay, in addition, the Regional Establishment Levy. The CNS requested the GPMC to waive fines and interest. This request was approved.

	1999-2000 Period ended 23-02-2000 R	1998-1999 Year ended 31-03-1999 R
	(122,039)	538,069
Regional services levies, current year	47,354	42,935
Regional establishment levies, current year	53,827	41,599
Regional establishment levies, previous years	0	229,755
Penalties on regional establishment levies, previous years	(223,220)	223,780

11. Change in accounting policy

At the end of the current financial period it was decided to recognise the full post retirement medical benefit liability in terms of AC 116 (revised 1999). This liability was previously disclosed as a contingent liability. The statement could not be applied retrospectively, since an actuarial valuation was not performed for prior years and therefore the effect on previous years could not be determined accurately. In terms of the above, the total impact at the end of the period amounted to R 9 739 000 and has been disclosed separately in the Statement of Changes in Equity.

NOTES TO THE FINANCIAL STATEMENTS

Schedule C

Fixed assets

Refer to schedule B, note 3.

1999-2000 Period ended 23-02-2000	Furniture R	Office equipment R	Scientific and technical equipment R	Computert equipment R	Property R	Total R
Carrying amount at 31-03-1999	305,687	117,079	145,766	1,041,763	427,500 **	2,037,795
At cost	503,985	429,236	2,136,595	4,536,337	427,500	8,033,653
Accumulated depreciation	(198,298)	(312,157)	(1,990,829)	(3,494,574)	0	(5,995,858)
Additions	46,483	274,149	106,010	675,968 *	0	1,102,610
Disposals	(77)	(531)	0	(583) *	0	(1,191)
At cost	(1,674)	(948)	(1,416)	(91,635)	0	(95,673)
Accumulated depreciation	1,597	417	1,416	91,052	0	94,482
Depreciation	(45,334)	(94,256)	(27,111)	(702,621)	0	(869,322)
Carrying amount at 23-02-2000	306,759	296,441	224,665	1,014,527	427,500 **	2,269,892
At cost	548,794	702,437	2,241,189	5,120,670	427,500	9,040,590
Accumulated depreciation	(242,035)	(405,996)	(2,016,524)	(4,106,143)	0	(6,770,698)

1998-1999 Period ended 31-03-1999	Furniture R	Office equipment R	Scientific and technical equipment R	Computert equipment R	Property R	Total R
Carrying amount at 31-03-1998	283,044	149,246	83,468	979,876	427,500 **	1,923,134
At cost	479,501	388,105	2,070,080	4,159,404	427,500	7,524,590
Accumulated depreciation	(196,457)	(238,859)	(1,986,612)	(3,179,528)	0	(5,601,456)
Additions	157,339	69,632	79,656	721,576 *	0	1,028,203
Disposals	(78,33)	(13,497)	(423)	(31,045) *	0	(123,296)
At cost	(132,855)	(28,501)	(13,140)	(344,643)	0	(519,139)
Accumulated depreciation	54,524	15,004	12,717	313,598	0	395,843
Depreciation	(56,365)	(88,302)	(16,935)	(628,644)	0	(790,246)
Carrying amount at 31-03-1999	305,687	117,079	145,766	1,041,763	427,500 **	2,037,795
At cost	503,985	429,236	2,136,595	4,536,337	427,500	8,033,653
Accumulated depreciation	(198,298)	(312,157)	(1,990,829)	(3,494,574)	0	(5,995,858)

* Includes Y2K expenditure (see note 9).

** The property consists of an office block situated on erf 3187 Melkbosch Strand in the Blaauberg Municipality, Cape Division, Western Cape Province. It was acquired on deed of sale dated 3 October 1996 at the cost of R 427 500,00 and registered in the name of the Council on 22 April 1998.



