Annual Report 2000-2001



MISSION

To provide and implement a national framework for effectual risk management for the protection of persons, property and the environment against nuclear damage.

VISION

We strive to be recognised as the leading authority in the provision of a national framework for effectual management of risk of nuclear damage.

ABBREVIATIONS USED IN THIS REPORT

DEAT – Department of Environmental Affairs and Tourism
DME – Department of Minerals and Energy
DWAF – Department of Water Affairs and Forestry
EIA – Environmental Impact Assessment
EPLC – Emergency Planning Liaison Committee
EXCO – Executive Committee
FRAREG – Framatome Regulator's Group
IAEA – International Atomic Energy Agency
IDCC – Interdepartmental Co-ordination Committee
IDMC – Interdepartmental Disaster Management Committee
IRPA – International Radiation Protection Agency
JRC – Joint Review Committee
KEDC – Koeberg Environment Development Committee
KLLC – Koeberg Licensing Liaison Committee
KNPS – Koeberg Nuclear Power Station
KSR – Koeberg Safety Review
MANCO – Management Committee
NECSA – South African Nuclear Energy Corporation
NERS – Network of Nuclear Regulators with Small Nuclear Programmes
NNR – National Nuclear Regulator
NNRA – National Nuclear Regulator Act
NUSSC – Nuclear Safety Standards Committee
PBMR – Pebble Bed Modular Reactor
PFMA – Public Finance Management Act
RASSC – Radiation Safety Standards Committee
SAR – Safety Analysis Report
TRANSSC – Transport Safety Standards Committee
UK NSD – United Kingdom Nuclear Safety Directorate
WASSC – Waste Safety Standards Committee
mSv – Milli Sievert
µSv – Micro Sievert

NATIONAL NUCLEAR REGULATOR

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THE BOARD

THE PEOPLE AT THE HELM

DR M W MAKGOBA



Dr Makgoba is Chairman of the NNR Board, President of the Medical Research Council and leader of the South African Aids Vaccine Initiative (SAAVI). He obtained an MBChB (Natal) with merit in Medicine, in 1976; a Doctor of Philosophy at Oxford in Human Immunogenetics, in 1983; was elected Fellow of the Royal College of Physicians of London (F.R.C.P. Lond), in 1990 and a Fellow of the Royal Society of South Africa (F.R.S.S. Af), in 1994. Formerly he was Deputy Vice-Chancellor (Academic) and Ad Hominem Professor of Molecular Immunology at the University of the Witwatersrand.

MS N J MXAKATO-DISEKO



Ms Mxakato-Diseko is the South Africa Ambassador to the United Nations in Vienna, the Republic of Austria, the Republic of Slovenia and the Republic of Slovakia, and is the South African Permanent Representative to the IAEA, South African Permanent Representative to the Comprehensive Nuclear Test Ban Treaty Organisation (CTBTO) and alternate South African Governor to the Governing Board of the IAEA. She holds a BA Hon/MA Politics, Philosophy and Economics from the University of Oxford.

She is the Deputy Chairperson of the NNR Board.



MR L D S THOBEJANE

Mr Thobejane currently holds the position of Superintendent-General in the Department of Health and Welfare (Northern Province). He holds an MSc in Medical and Radiation Science. He previously worked for Eskom as Senior Nuclear Physicist, and consulted for the Department of Minerals and Energy, Department of Health and other governmental departments on health and policy issues before joining the Department of Minerals and Energy as Chief Director: Nuclear and Renewable Energy. He was acting Chief Executive Officer for the National Electricity Regulator before taking up his current position with the Department of Health and Welfare in the Northern Province.



MR N MOLOI

Nchakha Moloi is a qualified geologist by profession. He obtained his BSc (Geology Honours) at Wits University and is currently in the process of completing his MSc (Mining Engineering).

His vast knowledge and experience has been built up whilst working for Anglo American Corporations' De Beers; Rio Tinto Mining; and the ANC's Minerals and Energy Policy Centre. Apart therefrom, Mr Moloi also held the prestigious positions of CEO of Mazal Mining; Chairperson of Mintek; Special Advisor to the Minister Minerals and Energy; and is currently Acting CEO of the National Nuclear Regulator.

On a more personal note, Nchakha Moloi is married to Nombulelo - they have 3 children, ages 9, 4, and 2.



DR J M STEWART

Dr Stewart, the representative of organised business on the Board, is a mechanical engineering graduate of the University of the Witwatersrand, and currently holds the position of Mining Consultant at the Chamber of Mines of South Africa. He has 20 years' experience in mining-related research, including a doctoral thesis in human heat stress. Prior to taking up his current position, he was head of the Chamber's research organisation, where his focus was mainly on policy issues in the areas of safety, environment, technology and the economics of the South African mining industry.



MR E B MATHEBULA

Mr Mathebula is currently Director: Atmospheric Protection and Chemicals Management with the Department of Environmental Affairs and Tourism. He holds a BSc in Environmental Technology with majors in Environmental Chemistry and Chemistry. He taught for eight years prior to joining the Department of Environmental Affairs and Tourism in 1997 as Manager: Hazardous Materials Impact in the Environment, including radio-active waste and other waste.



MR W D M FOURIE

Mr Fourie obtained his BA, BA Hons and UED from Potchefstroom University and a Diploma in Public Administration from Pretoria University. He has attended various national and international courses on impact assessment and management. He worked for five years as a physics planner and 20 years on environmental management, specifically with environmental impact legislation and regulations.



MR B C WINKLER

Mr Winkler is a former Executive Officer of the NNR. He holds an MSc in Physics from the University of Stellenbosch. He was the first Safari I reactor Health Physicist. He is the Chairman of the ICRP Committee IV and has been a member of the Main Commission since 1996. He was a member of INSAG of the IAEA for the period 1996-1999.



MRS E K MOHAMED

Mrs Mohamed is Laboratory Superintendent in the Chemistry Department at the University of the Witwatersrand. She holds an advanced diploma in Chemistry from Paddington Technical College, London. Former posts held were Laboratory Manager at Adcock Ingram Pharmaceuticals and Chief Chemistry Technician at the University of Lesotho.



MR R C LOCKWOOD

Mr Lockwood represents communities which may be affected by nuclear activities. He holds an NTC III certificate from Muizenberg Technical College. In 1992 he obtained an Authorised Coach certificate from the Eskom Training Board and a nuclear safety awareness certificate from the National Calibration Service. He worked for Eskom at the Koeberg Nuclear Power Station from 1991-1996.



PROF S TAOLE

Prof 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 K BHARUTH-RAM

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



DR S W P DE WAAL

Dr de Waal, who serves on the Board as an official of the Department of Minerals and Energy, is the Director: Nuclear Energy in the Department. He is a qualified radiation biologist with 20 years' working experience in the South African nuclear industry. He is currently responsible for nuclear policy matters and the administration of nuclear-related legislation.



MR A H C H MOTAUNG

Mr Motaung is a Chief Director: Mine Health, Safety and Survey for the Department of Minerals and Energy. He holds a BSc Eng from the University of the Witwatersrand. Previously worked as a mining engineer, responsible for production, industrial relations, health and safety. He joined the Department of Minerals and Energy as a Director: Mine Safety, prior to taking up his current position.



MR D P ELBRECHT

Based in Cape Town, Mr Elbrecht is Treasurer-General of the National Union of Mineworkers, of which he has been a National Executive Committee member since 1994 and a national office bearer since 1997. The holder of an NTC 6, he worked as an artisan at the Koeberg Nuclear Power Station for eight years. He has numerous courses to his credit including two international nuclear studies and study tours to Europe and the USA. Other qualifications include, Associated In Management (AIM) at UCT Graduate School, EDP at Kagiso Leadership School, MDP at Stellenbosch Business School, IRDP at Stellenbosch Graduate Business School. He is Director of the Mineworkers Development Agency and the Elija Barayi memorial Training Centre and a Trustee of the Mineworkers Investment Trust and Teba fund.

MANAGEMENT COMMITTEES



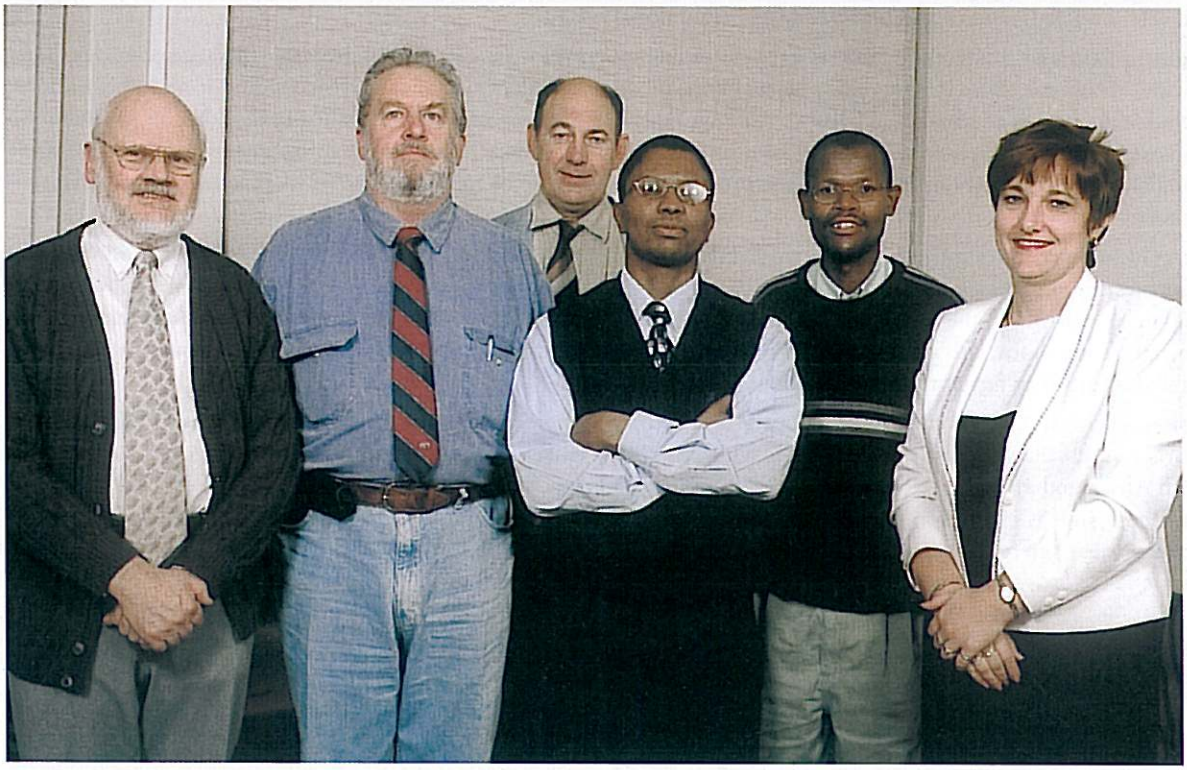
EXECUTIVE COMMITTEE (Senior Managers and Acting CEO)



MANAGEMENT COMMITTEE (Managers)

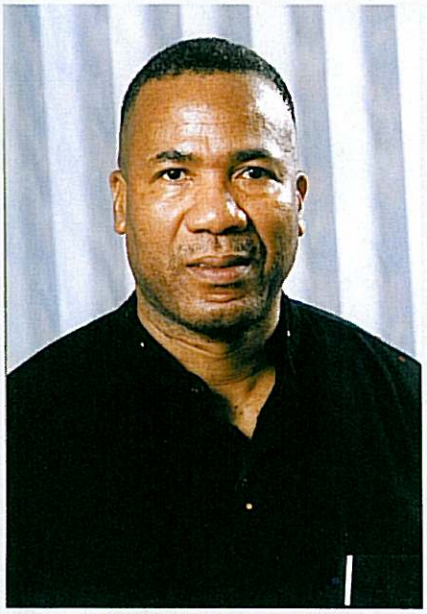


TRANSFORMATION COMMITTEE



STAFF ASSOCIATION

CHAIRPERSON'S FOREWORD



Dr M.W. Makgoba - Chairperson

It is my pleasure to deliver this report, covering the first full year of operations of the National Nuclear Regulator (NNR). The NNR was instituted in February 2000 to take over the regulatory function of the former Council for Nuclear Safety, which with its broader spectrum of responsibilities, had also addressed the developmental aspects of nuclear technology and related matters. As a dedicated nuclear regulator, the NNR is thus able to focus its attention solely on matters relating to the safety of workers in the nuclear industry (including in the mining sector) and that of the public affected or potentially affected by radiation, nuclear waste and the transport of radioactive materials. In keeping with a relatively new international trend, protection is now also extended to the natural environment.

Close attention was given during the review period to restructuring the NNR's operations in order to enhance efficiency and meet dynamic national needs. Equally important was the transformation of the personnel structure towards demographic representivity in accordance with national policy requirements. The NNR's Employment Equity Plan includes a staff development programme and capacity building initiatives, ensuring that people from the previously disadvantaged communities are given an opportunity to enter the nuclear industry.

Members of the Board of Directors, as well as management and finance staff, were provided with training to induct them into the requirements of the NNR Act and also into the requirements of the Public Finance Management Act. The purpose of the latter Act, which applies to all government and parastatal bodies, is to ensure fiscal transparency and the effective application of public funds.

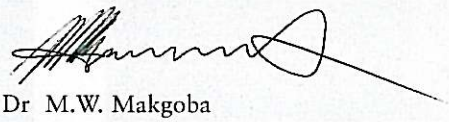
To enhance the day-to-day management of the NNR in meeting its broad spectrum of responsibilities, an Executive Committee (EXCO) consisting of the Chief Executive Officer and senior managers, and a Management Committee (MANCO) consisting of the EXCO and all managers were established.

As a cornerstone of its function, the NNR accorded high priority to public participation in the regulatory process, through forums with representatives of affected communities. Further initiatives are envisaged to keep the public informed on regulatory and safety related matters and involved in the regulatory processes.

Appropriate measures were introduced during the year to maintain safety margins and to provide assurance of nuclear safety nationwide. These measures include safety assessments, the monitoring of compliance with conditions of authorisations, and the regular inspection of relevant activities. An important and exciting new responsibility, undertaken in co-operation with international peer organisations, was that of assessing the public safety aspect in the development of Eskom's Pebble Bed Modular Reactor (PBMR) technology and the proposed manufacture of fuel for it by the SA Nuclear Energy Corporation (NECSA).

It became evident to us during the year that the NNR's income would no longer be adequate to sustain the increasing demands of succession planning and skills transfer, capacity building initiatives, co-operative governance and public participation initiatives. However, the Board considered it as critically important that these initiatives be maintained, and it allocated financial resources towards their continued implementation. Measures are being implemented to ensure that the NNR is adequately resourced in future to ensure the maintenance and further impetus of its initiatives.

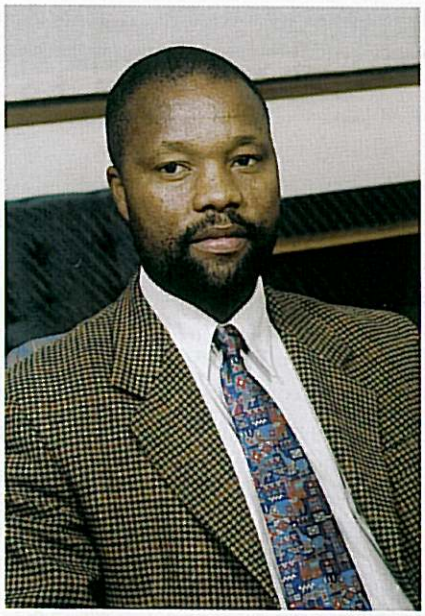
In conclusion, I wish to express my appreciation to my fellow Directors, and to the Management and Staff for their sustained efforts to meet the important objectives for which the NNR exists. We face dynamic new challenges and opportunities in South Africa and also in meeting the country's international responsibilities in the nuclear safety field. The calibre of our directors and staff is most encouraging and enables me to give the Government and people of South Africa the assurance that the nuclear safety of the nation is in sound hands.



Dr M.W. Makgoba
Chairperson

CHIEF EXECUTIVE OFFICER'S REPORT

Background



Mr Nchakha Moloi - Acting CEO

The National Nuclear Regulator Act (Act 47 of 1999) was promulgated on 23 December 1999 and came into force on 27 February 2000, thereby converting the Council for Nuclear Safety (CNS), which had been constituted under the Nuclear Energy Act of 1982, into a new regulatory body, namely the National Nuclear Regulator (NNR), with a new and broadened mandate. Over the past year the organisation has developed a comprehensive plan for implementing the new legslation, including the identification and prioritisation of the new regulations and giving effect to the transitional arrangements agreed with the Department of Minerals and Energy.

At the beginning of each financial year the NNR Executive sets performance objectives and targets, which are then regularly monitored. For the financial year under review, the performance objectives focussed on are inter alia the effectual transformation of the CNS into the NNR and the implementation plan for the new Act.

Corporate Affairs

The institution continued to increase its funding from service levies whilst the State's contribution declined by 0.4% in real terms from the previous year. The direct cost to the fiscus of the organisation's programme of activities in the year under review was R6 762 000, compared to R6 088 000 for the previous year. This unfortunately came at a time when the organisation was faced with tough challenges of transformation, in respect of both the nature of the way we do business and the demographic representivity of the NNR.

A positive increase in revenue derived from the levies, of some 27,56% since the previous year, was achieved to reach an annual level of some R29,159m. Of these levies 85,181% was from our long-term clients and 14.19% from the new initiatives such as the PBMR project.

Whilst the gold mining industry was undergoing major reorganisation to cut costs in the face of a sustained downward pressure on the gold price, the industry continued to support efforts to lower the risk of ionizing radiation to workers, people around the mining operations and the environment.

The organisation continues to carry out its corporate responsibilities diligently. In particular, significant progress was made in the following areas:

- A large portion of resources was committed to the development of draft regulations relating to the establishment of safety standards and regulatory practices as contemplated in section 36 of the Act, following a review process involving all relevant interested and affected parties.
- The NNR is part of a radioactive waste group established by the Department of Minerals and Energy (DME) to develop a status report, policy and strategy on radioactive waste management.
- The organisation took the lead role in the establishment of the post-graduate course in radiation protection at the University of the Witwatersrand and assisted the University of North West with its post-graduate course in radiation science as part of its continued commitment to national capacity building.
- The organisation strengthened its associations and relationships with international organisations such as the International Atomic Energy Agency, other regulatory authorities and related organisations to keep abreast of international nuclear, radiation and waste safety issues.

Restructuring

During the year under review the organisation went through the first restructuring and reorganisation programme to deploy its resources to meet the challenges of the new NNR Act. The new structure represents a fundamental change at the corporate level, and ushered in new requirements in working relationships and methods, such as new work teams and redefined objectives, as well as the re-establishment of internal linkages. New divisions were created and further decentralization of services to the Western Cape was effected.

Significant progress has been made in implementing this change to the corporate structure, largely due to the support and commitment of all staff members and their understanding of why this change is necessary and why it is due.

Although substantial and quantified information on the performance of the organisation is contained in the Directors' Report, the following is a brief appraisal of each of the major components and activities over the year under review.

Nuclear Authorization Projects

The NNR continues to ensure that an adequate level of safety, commensurate with the regulatory requirements, is main-

tained through safety assessment, continuous improvement of the nuclear authorisations, and implementation of an effective compliance assurance programme in its licensing activities, including:

- Power reactors
- Radioactive waste management
- Military nuclear installations
- Mining and mineral processing

However, the organisation is faced with major challenges in its sphere of operation:

• A license application, in line with the South African Cabinet decision of 12 April 2000, was received from Eskom for the prospective siting, construction, operation, decontamination and decommissioning of a demonstration Pebble Bed Modular Reactor (PBMR) nuclear power station. A similar application was received from the SA Nuclear Energy Corporation (NECSA) for the licensing of a PBMR fuel manufacturing plant at the BEVA site, Pelindaba. The licensing process, including public participation in accordance with the requirements of the NNR Act, will extend into 2001-2002.

- Progressing the licensing issues associated with radioactive waste management including inter alia:
  Waste quantification, characterisation and categorisation
  Vaalputs long-term safety assessment
  Thabana long-term safety assessment
  Pelindaba long-term radioactive waste storage facility
- Progressing the issues relating to the rehabilitation of off-mine sites.
- Ensuring that radiation doses in underground mines that exceed the annual dose limit are reduced.
- Co-ordination of research on the aspects related to radiation in mines. Some of the targeted areas for in-depth investigations include:
  The national natural background radiation level
  The national radiation levels of radon, both indoors and outdoors
  The relationship between radioactivity levels in various media and radiation dose.

Regulatory Strategy and Development

As part of its restructuring programme the organisation consolidated all its research and development efforts under one division.

The Act prescribes a relatively short term of three years (renewable) for the Chief Executive Officer of the NNR. The Regulatory Strategy and Development Division (RSD) will ensure continuity and sustained smooth implementation of the organisation's business strategies.

Some of the immediate challenges facing the RSD include, amongst others:

- Improving the corporate image of the NNR through a focussed communications strategy and activities aimed at enhancing the image of the organisation;
- Building research capacity in the organisation, focussed on well defined, appropriate and targeted research programmes;
- Mobilising resources to enhance support/capacity building programmes for the Board of Directors and providing efficient Company Secretary services;
- Enhancing corporate planning and legal services.

Internal Transformation

Through various initiatives including the Board Transformation Committee, the organisation has completed an analysis of the issues that may have affected meaningful progress towards creating a fully equitable and demographically and gender-representative organisation on all levels. Many of the identified issues have been progressed or are being phased in. Successful programmes in this area include a structured training and development programme for the entire NNR staff, bursary schemes for previously disadvantaged persons, and improvement in representivity over the previous years.

The organisation still faces major challenges in redressing historical imbalances on the professional and management levels. The most pressing area where redress is required remains gender representivity on all levels in the organisation, with women comprising only 26% of the total staff of the organisation.

The management and staff of the organisation have shown their unwavering commitment to full transformation of the organisation.

The NNR is a knowledge-intensive organisation and its greatest asset is its dedicated and supportive staff. The NNR management extends its thanks and deep appreciation to all staff members.

The NNR management also records its appreciation for the support and leadership of the Chairperson of the Board and all the Board Members. Amidst his demanding business commitments, he and the Board have served us well.

Last but not least, the assistance and guidance of the Minister of Minerals and Energy, Ms P Mlambo-Ngcuka, the Deputy Minister, Ms S Shabangu as well as the Director-General of the Department of Minerals and Energy, Mr S Nogxina and his staff, is greatly appreciated, in guiding the organisation with many policy matters.

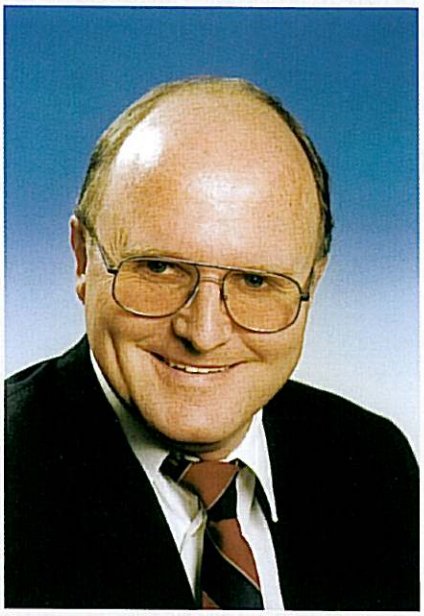


Nchakha Moloi
Acting Chief Executive Officer

NATIONAL NUCLEAR REGULATOR

PERIODIC SAFETY ASSESSMENT

In December 1994, the NNR requested Eskom to conduct a periodic safety reassessment of Koeberg in view of the fact that the plant had been operational since 1984. Such a review would be in line with the concept of a ten-yearly periodic review, which is considered to be good practice internationally.



Dr T F Hill, Manager: Koeberg Projects

While the safety assessment for Koeberg has been regularly updated in compliance with the licence, to reflect modifications to the installation, the objective of a periodic review would be to benchmark the plant against current international standards. A safety re-assessment is a major undertaking, for which the NNR and Eskom would have to expend extensive resources. The project involved approximately 100 man-years for Eskom staff and 6 man-years for NNR staff. The process was seen as complementary to the licensing activities conducted to date.

In formulating the process, discussions took place between the NNR and the French nuclear safety authority, DSIN. DSIN is responsible for licensing nuclear power stations similar to Koeberg within the French nuclear power programme and had embarked upon a similar re-assessment process.

The objectives of the Koeberg Safety Re-assessment Project (named the KSR Project) were:

- To compare the safety case for Koeberg against an up-to-date internationally recognised standard, namely the French CP-1 series of plants similar to Koeberg. This entailed comparison of the design basis of the systems and components and the operating practices at Koeberg with current internationally recognised standards and re-validation of the Koeberg risk assessment methodology. The latter would be used to ensure that the plant still met the risk criteria laid down in the fundamental standards of the NNR, taking into account the cumulative effects of modifications and plant ageing.
- To revise the Koeberg Safety Analysis Report in a format similar to that of the French CP-1 plants, which would facilitate such a comparison.

The project commenced in April 1995 with the formulation of the NNR requirements. Eskom completed the re-assessment in December 1998, and the results as well as recommended actions are documented in a Safety Re-assessment (SRA) report, which was submitted for to the NNR for review in December 1998. The NNR completed its review in July 1999.

As a general conclusion it can be said that the broad objectives set for the KSR Project have been achieved. The various stages of the periodic review and the activities of Eskom and the NNR were reported in the NNR's 1999 and 2000 Annual Reports.

The comparison between the updated Koeberg safety documentation and the selected French referential identified approximately 500 differences between Koeberg and the French CP-1 plants. Following application of an approved screening process, approximately 140 of these differences of potential safety significance were retained for further assessment. The remainder were determined by Eskom, in concurrence with the NNR, as having no nuclear safety significance. During this process, no differences were identified as requiring immediate corrective action.

The SRA report produced by Eskom includes a comprehensive listing of findings and recommendations.
The report concludes that no deficiencies have been identified that require immediate corrective action. However, some short and medium term measures are required to either justify differences or to resolve some of the issues identified. The NNR generally agreed with Eskom's conclusions but required a number of additional actions. Overall, the measures needed to bring Koeberg in line with the CP-1 referential include:

- A number of modification proposals (eight short term and 13 medium term) aimed primarily at reducing dependence on operator actions in the event of an accident.
- A number of safety studies to be performed, including:
  - Updating of the Koeberg Probabilistic Risk Assessment (PRA)
  - Reassessment of "external hazard accidents" (e.g. fire, flooding, aircraft crash, seismic, internal missiles including pipe rupture)
  - Other accident scenarios covered in the current safety case for CP-1 plants but not addressed in the Koeberg safety analysis report
  - Justification that the codes currently being applied at KBG are still adequate today, particularly those relating to the periodic review of the primary circuit (end-of-life) integrity
  - A number of severe accident issues, including containment fragility and containment venting and hydrogen control
- Updating of safety case documentation and linkage to rules, codes and standards, accident management, operating

technical specifications and classification of System Structures and Components.

Eskom and the NNR have agreed on a programme of actions to address the above issues, on the basis of which the NNR accepted that the main objectives of the KSR Project have been achieved and that continued operation of the plant is justified. The NNR is monitoring the progress of implementation of the agreed actions at the monthly Koeberg Licensing Liaison Committee meetings held between Eskom and the NNR

SPENT FUEL STORAGE

Units 1 and 2 at Koeberg Nuclear Power Station were put into commercial service in 1984 and 1985 respectively. Initially it was intended that spent fuel assemblies would be stored in the spent fuel pools at the power station for a maximum period of four years, after which they would be transferred to an interim dry storage facility which would be created at a safe site, unidentified at the time.

By 1986 an appropriate dry storage facility system had not yet been identified, and as the exhaustion of the installed capacity of the pools (285 cells per pool) was approaching, the initial racks were replaced in 1988 with high density racking with a capacity of 728 cells per pool.

In 1990 an order for four Castor type X/28F licensed dual transport/storage casks was placed, in anticipation that transportation from the Koeberg spent fuel pools to the remote interim dry storage site would take place. The casks could also function as a contingency storage capacity for 112 spent fuel assemblies.

In 1995 Eskom began a feasibility study to establish an optimum interim storage facility. Ultimately two storage options were identified:

- Dry storage
- Spent fuel pool re-racking

For the dry storage options, the following were considered:

- Metal casks – The Castor casks referred to above
- Vault - Modular vault dry storage
- Concrete bunker
  - Nuhomes system from Framatome, Vectra
  - Idees system from Robatel/Rotek
  - Ventilated storage casks from BNFL/Sierra Nuclear

Super high-density racks were considered to accommodate the storage requirements at Koeberg for 40 years. Borated stainless steel would be used as a neutron absorber to ensure subcriticality. The added advantage of this option is that borated stainless steel does not shrink or swell (a problem encountered with the previous racks) and exhibits better corrosion resistance than the previous racks.

Eskom finally concluded that wet storage was the most viable option.

However, due to delays in the re-racking project, Eskom had to develop a contingency plan, which involves the use of the dry storage casks referred to above. Eskom purchased four casks, each with a capacity of 28 fuel assemblies. These casks could provide enough storage space to delay the need for high-density storage racks by one fuel cycle on each unit. The safety case, presented by Eskom for the use of the casks as an interim spent fuel storage measure for three years, was approved by the NNR in February 2000 and inspections were carried out to verify compliance with conditions for



Construction work on the storage area casks



Storage casks

the various NNR hold points.

Subsequently all four casks were loaded and are stored in an appropriate building on the Koeberg site. Access to the storage area is controlled by a security plan, which was agreed with NNR. Temperature and cask pressure are monitored continuously and all indications are within specifications.

In parallel, Eskom applied to the NNR for permission to commence the re-racking of the spent fuel pools. This would accommodate all the spent fuel that will accrue during the remaining lifetime of the plant.

The main aspects of the NNR review of the safety case submitted by Eskom were as follows:

- Criticality safety

The NNR consulted with the nuclear regulators in the US, UK, France and Spain on the methodology used for the criticality analysis for the high density racks, and for evaluating the rack design and measures in place to prevent criticality accidents. As a result of these investigations, changes were made in the analysis, and additional safety measures were eventually implemented. These included, for example, spargers to spray make up water introduced at the top of the pool and locking devices to reduce the possibility of human error.

- Spent Fuel Pool Cooling

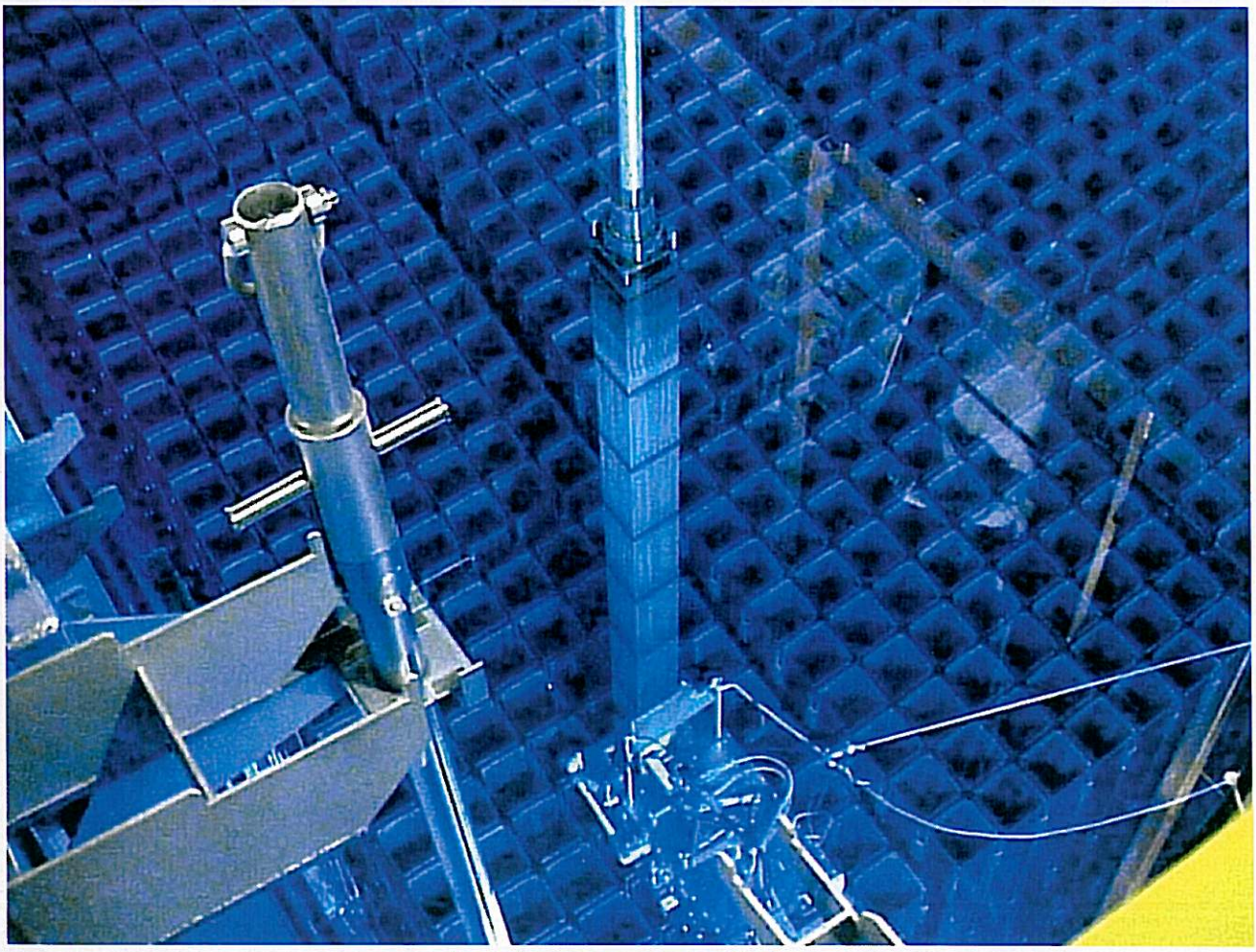
Computational fluid dynamic studies were performed on the cooling of the fuel assemblies in the racks. Eskom has committed to upgrading the cooling system to provide greater redundancy and to cater for decay heat loads during refueling outages.

- Structural analysis

Computational studies were performed on the civil structures of the pool, the fuel racks and fuel assemblies in the pool and cranes used for the installation of the racks and for fuel movement, to demonstrate that these structures could withstand various accidents such as credible earthquakes and the dropping of heavy loads.

- Installation phase

The NNR assessed the activities planned for the installation phase and has been conducting inspections on a daily basis during this phase of the project.



Spent fuel storage pool at Koeberg

Following its in-depth review of the safety case presented by Eskom, the NNR gave approval to Eskom to commence re-racking operations in the spent fuel pool of Unit 1 in November 2000. The work was satisfactorily completed during April 2001 without encountering any major installation problems. Unit 2 re-racking is due to commence in July 2001.

THE NUCLEAR FUEL MANAGEMENT STRATEGY

With the opening up of the international market, Eskom decided to introduce a second vendor, i.e. Westinghouse, as a nuclear fuel supplier for the Koeberg reactors. The strategy is that Units 1 and 2 at Koeberg will use fuel supplied by Westinghouse and Framatome respectively. The purpose of introducing newer more advanced fuel designs with enhanced safety features, is to increase the fuel cycle length so as to reduce outage time, thereby improving plant availability. The reduction of the number of refuelling outages has a safety benefit as well.

During Outage 111 in May 2000, four "lead use assemblies" of Westinghouse design were loaded into Koeberg Unit 1 as the forerunner to a full reload of 52 assemblies for the following outage in August 2001. During Outage 211 in February 2001, four Advanced Fuel Assemblies AFA -3G assemblies of Framatome design were loaded into Unit 2. A full reload of these will be introduced in Outage 212 in April 2001.

The NNR is in the process of conducting technical assessments of the safety analyses for these various fuel types prior to their introduction to the plant. The NNR has approved the use of an advanced Framatome fuel assembly (AFA-3G) in the Koeberg reactors under the current fuel management strategy.

Eskom fuel engineers are in the process of reviewing the use of a new Framatome fuel assembly type, the AFA-3GA, under an improved fuel management strategy. Their intention is to obtain NNR approval to load four lead use assemblies of this type in the Unit 2 reactor in May 2002 and to load a full batch of these fuel assembly types with an enrichment of up to 4,95% in subsequent cycles.

EMERGENCY PLANNING AND PREPAREDNESS (TECHNICAL BASES)

In addition to demonstrating compliance with the safety criteria laid down by the NNR, Eskom is required as a condition of licence to draw up, implement and maintain an effective emergency plan. In view of the rate of development in the environs of Koeberg, and in parallel with the periodic safety reassessment of Koeberg, the NNR decided that it was necessary to revisit the technical basis for the emergency plan and associated population development restrictions in the Koeberg environs.

This review comprised four distinct aspects, namely:

- Review of the emergency plans and arrangements presently in place, and their effectiveness
- Assessment of the emergency planning zones (particularly the radii) and criteria on the time it would take to evacuate the population of a particular zone in the event of a severe accident
- Population projections up to the year 2030
- Evacuation time modelling (traffic modelling) to establish that the present and projected population levels would comply with the evacuation time criteria.

Eskom contracted, in agreement with the NNR, the services of a Canadian consulting company to undertake a review of the first two items above. Consideration was given to a range of possible accident scenarios, corresponding radiological releases, meteorological conditions and the probabilities of accidents. This work has been completed and the NNR has submitted a report to the NNR Board concluding that the present emergency planning arrangements around Koeberg are acceptable and that the zones should remain as they are.

As part of the above project, the population projections and traffic modelling have been performed by the Cape Metropolitan Council and its consultants. The traffic modelling, performed under the direction of a steering committee representing the NNR, Eskom and local authorities, comprised a number of analyses of present and future developments in the Blaauwberg area at various time intervals from the present up to 2030, assuming different options on road and infrastructure development.

This work has also been completed and indicates that in the light of the rate of developments in the Koeberg area, the implications of retaining the outer radius of the "Urgent Planning Zone" (UPZ) at 16 km could be restrictive on such developments in 20 or 30 years' time.

In considering the implications that potential adjustments to the Koeberg emergency planning arrangements may have, for example, on population and infrastructure developments in the environs of the power station, the NNR Board of Directors formed a committee to progress this issue towards the finalisation of a plan which will be favourable to all affected and interested parties. Taking into consideration all implications associated with the Koeberg emergency plan, e.g. public safety considerations, socio-economic considerations such as developments around Koeberg, etc, this committee felt that, in order to provide informed conclusions and recommendations to the NNR Board of Directors, it was necessary to canvass the views, opinions and perspectives of a wider forum of public representation. This should include

inter alia the Cape Metropolitan Council (CMC), local authorities, environmental groups, NGOs, the labour component, residents' associations etc. Accordingly, interested and affected parties were identified and notified to participate in a workshop to debate the various views and opinions on this important issue.

The purpose of the workshop was not to enter into major technical discussions of the development and review of the technical bases of the Koeberg emergency planning arrangements, but rather to obtain and debate the views, opinions and perspectives of the participants on the implications of the current Koeberg emergency planning arrangements and the implications of making possible adjustments to those.

The NNR Board committee is currently considering and assessing all relevant inputs received in order to provide its recommendation to the NNR Board of Directors. Once the Board of Directors has formulated a decision on this issue, there will be a report-back information session to all parties who participated in the workshop.

COMPLIANCE ASSURANCE

Major modifications implemented at Koeberg

Apart from the fuel management strategy and spent fuel pool re-racking and dry storage cask projects reported on above, the following major modifications have been implemented at Koeberg over the past year, after being reviewed and approved for implementation by the NNR:

- Installation of a Standby Battery Bank to allow for online maintenance of the existing batteries. The batteries provide emergency power for the control systems and alarms in the event of loss of normal power supplies.
- Upgrade of the alarm windows in the control room for improve visibility and future additions to the control room panels.
- Upgrade Spent Fuel Pool Manipulator Crane to improve speed of unloading, and the incorporation of an improved tracking system to prevent fuel loading error.
- Upgrade the primary circuit level measurement to improve monitoring and control of the water level during outages when the water inventory is reduced.
- Upgrade of the K1 transmitters, which are used for the monitoring of containment parameters (pressure, radiation levels), to enable them to withstand a wider range of severe accident conditions.

In-service inspection

As in previous years, a series of specialist meetings were held at Koeberg Nuclear Power Station involving representatives of the NNR, Eskom Inspection and Test Department and Eskom's Generation and Safety Assurance Group. These were held in April, July, October and February and involved discussions on technical issues arising both locally and internationally in the area of in-service inspection and material integrity issues. During this particular period there were two planned refueling outages, the 11th for each reactor, and it was during these shutdown periods that most of the in-service inspections were done by Eskom staff. Eskom reports on all inspections done within the mandatory in-service inspection programme are submitted to the NNR for acceptance.

The main items of interest and importance that were identified and discussed during this period included the following:

Performance demonstration: The qualification of inspection procedures through the implementation of a systematic validation exercise by the Inspection and Testing Department at Koeberg continues to be monitored by the NNR. The successful completion of this exercise, expected during 2002, will give more confidence in the ability of the inspections done and also allow for better quantification of the reliability of these inspections. However, the human reliability aspect will probably remain an item for further consideration and resolution.

Thermal fatigue of piping in Residual Heat Removal system: Arising out of reported concerns on French nuclear power plants, a programme of inspection and replacement of affected piping was implemented at Koeberg.

Steam generator tubing: Despite having degraded tubing, the plant continues to operate well within the limits of the operating technical specifications. Some fluctuations are reported in the measured amounts of leaks, but the tubes continue to retain a sufficient margin of integrity within the limits approved by the NNR for safe operation. This includes an ability to withstand any anticipated accident condition.

Reactor pressure Vessel Surveillance Programme (RVSP): During both of the refueling outages, capsules of irradiated samples of the vessel material were routinely removed for mechanical testing (one sample from each vessel). These tests are the requirements of the RVSP, which is designed to give early warning of unanticipated irradiation embrittlement of the vessel material. The tests are done in France and the results are not expected to be finalised and submitted to the NNR until 2002.

Results obtained to date indicate that the vessels will comply with internationally recognized Pressurized Thermal Shock criteria for at least the design life of 40 years.

Licensing of Koeberg reactor operators

The NNR is responsible for the licensing of control room operators at an acceptable standard and for ensuring compliance with NNR requirements. The NNR Koeberg Project Department discharges this responsibility by controlling, maintaining and

administering the licensing of reactor operators at the power station. Only operators licensed by the NNR are permitted to manipulate the control room panels.

As an ongoing compliance assurance activity, the NNR monitors the six-weekly re-qualification tests, as well as the annual and biennial evaluations of the operators on the simulator. These evaluations also include a theoretical examination.

As part of its compliance assurance activities, the NNR performs six-monthly medical and psychological monitoring of the control room operators.

During the reporting period, six Senior Reactor Operator licenses and three Reactor Operator licenses were issued to candidates by the NNR. In an attempt to progress performance base licensing, the NNR gave Eskom approval to prepare and implement the January and April 2001 initial licence examination with strict NNR oversight.

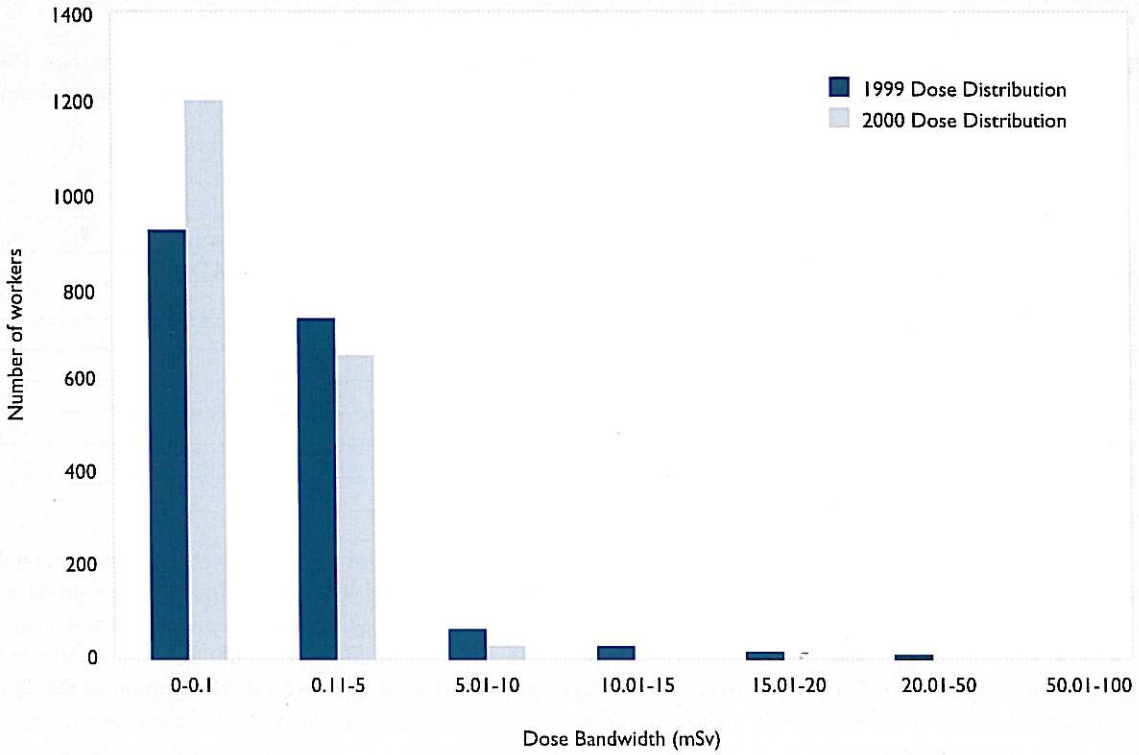
Occupational exposure to radiation

Radiation exposures to personnel working at Koeberg are subject to control by the operational radiation protection programme. This programme ensures that control within the annual individual dose limit is achieved. In addition, the programme also serves to ensure that all doses are kept as low as reasonably achievable (ALARA).

The highest annual individual dose accrued during 2000 was 9,44 mSv, compared to the regulatory limit of 50 mSv per annum. The total annual collective dose to the workforce for the year was 0,85 person-sievert. The total occupationally exposed workforce during 2000 numbered 1894, indicating an average annual individual dose of approximately 0,45 mSv. Figure 1 illustrates the dose distribution arising from the individual exposures accrued during 2000.

A major contribution to the total collective dose was the work performed during refueling Outage 111, in which 0,62 person-sievert was accrued. The collective dose accrued as a result of this outage contributed 73% of the total annual collective dose recorded for 2000. However, this was the lowest collective dose to date for a refuelling outage and can be considered as an exceptional achievement. The main factors can be attributed to the outage workscope and the greatly improved Dose Reduction Awareness programme.

Figure 1: Number of workers vs Dose Bandwidth

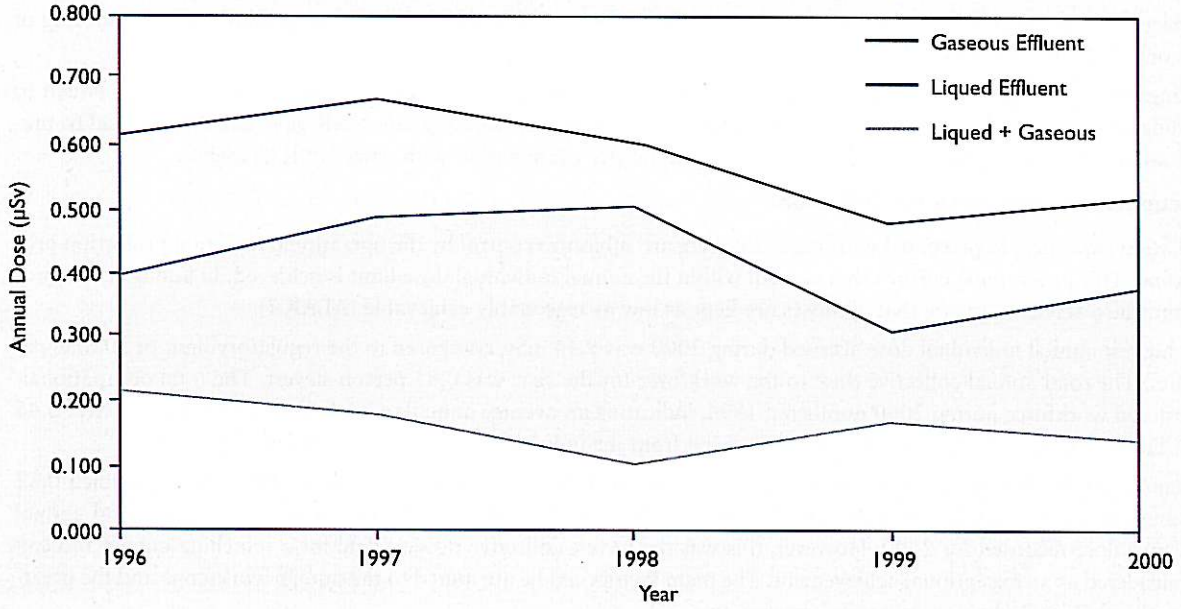


Public exposure

Various gaseous and liquid radioactive effluents are produced during the process of nuclear power generation. These effluents are treated by dedicated clean-up systems, which remove most of the radioactivity from the 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 significant risk to members of the public. A key feature of this programme is the con-

trol of radioactivity in effluent discharges to within the Annual Authorised Discharge Quantities (AADQ). 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 is maintained on public exposure to radioactive releases.

Figure 2: Variation in Annual Dose Due to Koeberg Effluent Discharges



Radioactivity in liquid and gaseous effluent discharges from Koeberg during 2000 contributed a total individual dose of 0,53 µSv to the hypothetically most exposed group. The dose as a result of gaseous and liquid effluent discharges was 0,143 µSv and 0,384 µSv respectively, which is well within the NNR limit of 250 µSv per annum (Figure 2).

It is evident that the annual dose arising from effluent discharges from Koeberg has been consistently low at less than 1% of the NNR dose limit. The radionuclides contributing the highest dose as a result of atmospheric and liquid discharges are shown in Table 1.

Table 1: Percentage of AADQ Discharged in Effluent During 2000

Atmospheric Transport Pathway		Liquid Transport Pathway	
Radionuclide	% of AADQ	Radionuclide	% of AADQ
134I	47.87	58Co	5.34
132I	11.76	57Co	12.37
3H	39.72	125Sb	17.08
135I	8.56	97Zr	6.04
	110mAg	6.79	
	3H	10.79	

Environmental surveillance

The Koeberg Environmental Surveillance Programme, involving sampling and analysis of representative environmental media, is performed to verify that effective control has been maintained over effluent discharges. The small amounts of tritium released from Koeberg could not be identified in either in-land water 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 at 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. As in previous years, there were no indications of external radiation above normal background levels, whether close to the power station or further afield. The environmental surveillance programme has confirmed adequate control over effluent discharges in the period under review.

Radioactive waste management at Koeberg

Generation of solid radioactive waste amounted to 72,8 m3 drummed in metal drums and 22,1 m3 drummed in concrete drums. The inventory of the drummed radioactive solid waste produced in 2000 is given in Table 2.

Table 2: Inventory of solid radioactive waste produced in 2000 and drummed in various types of drums.

Type of solid radioactive waste	No. of drums
C1 drums containing non-compressible waste	4
C1 drums containing concentrates	24
C1 drums containing resin	37
C2 drums containing resin	1
C4 drums containing filters	4
C2F drums containing filters	5
210 litre metal drums containing general trash	313
210 litre metal drums containing resin	138

Koeberg Emergency Exercise 2000

As part of an ongoing process of testing the emergency plan for Koeberg Nuclear Power Station, emergency exercises are held on an 18-month cycle. The exercise was conducted on 19 July 2000. It tested the response of the on-site emergency services and the off-site mobilization of the intervening organizations such as the Cape Metropolitan Council, City of Cape Town, Blaauwberg and City of Tygerberg.

The exercise was focused mainly on the off-site organisations, although the station on-site response was also tested, and there it was non-technical in nature. The scenario was designed around the exposure of nuclear fuel and ensuing containment failure leading to the rapid off-site release of radioactive materials. The wind directions and release resulted in the Protection Actions required in Melkbosstrand and Duynefontein as a minimum.

The overall response from Eskom was acceptable and executed according to the plan. There was an improvement in communication and cooperation compared to the previous exercise.

All the organizations concerned participated and responded well to the emergency, although some deficiencies were noted.

The NNR identified a few weaknesses in the responses as required by the exercise and these are in the process of being corrected.

Plant occurrences/incidents

The NNR monitors occurrences at Koeberg in the following manner:

- Audits conducted on the Eskom processes relating to occurrences (i.e. plant monitoring, reporting, follow-up and close-out)
- Monitoring of the implementation of these processes
- Monthly meetings between Eskom and the NNR at which experience feedback is discussed
- Review of Eskom reports on experience feedback and safety indicators which reflect occurrences and trending thereof
- Direct assessment of selected significant occurrences.

International events are monitored by Eskom and the NNR. Eskom systematically screens information from sources such as WANO (World Association of Nuclear Operators), INPO (International Nuclear Plant Operators), IAEA (International Atomic Energy Agency), US-NRC (United States Nuclear Regulatory Commission) and EDF (Electricité de France). Apart from monitoring Eskom processes in this regard, the NNR similarly screens information from the IAEA and information is exchanged with other regulatory bodies through bilateral agreements.

By the above means the NNR satisfies itself that the processes implemented at Koeberg relating to occurrences are acceptable and that plant safety performance is also acceptable.

Since South Africa is a member state of the International Atomic Energy Agency (IAEA), both Koeberg and the NNR use the International Nuclear Event Scale (INES) to rank occurrences. INES is a worldwide standard for the international nuclear community for rating the nuclear safety significance of occurrences. It was developed jointly by the IAEA and the Nuclear Energy Agency of the OECD. The scale runs from zero, for events with no safety significance, to seven for a major accident.

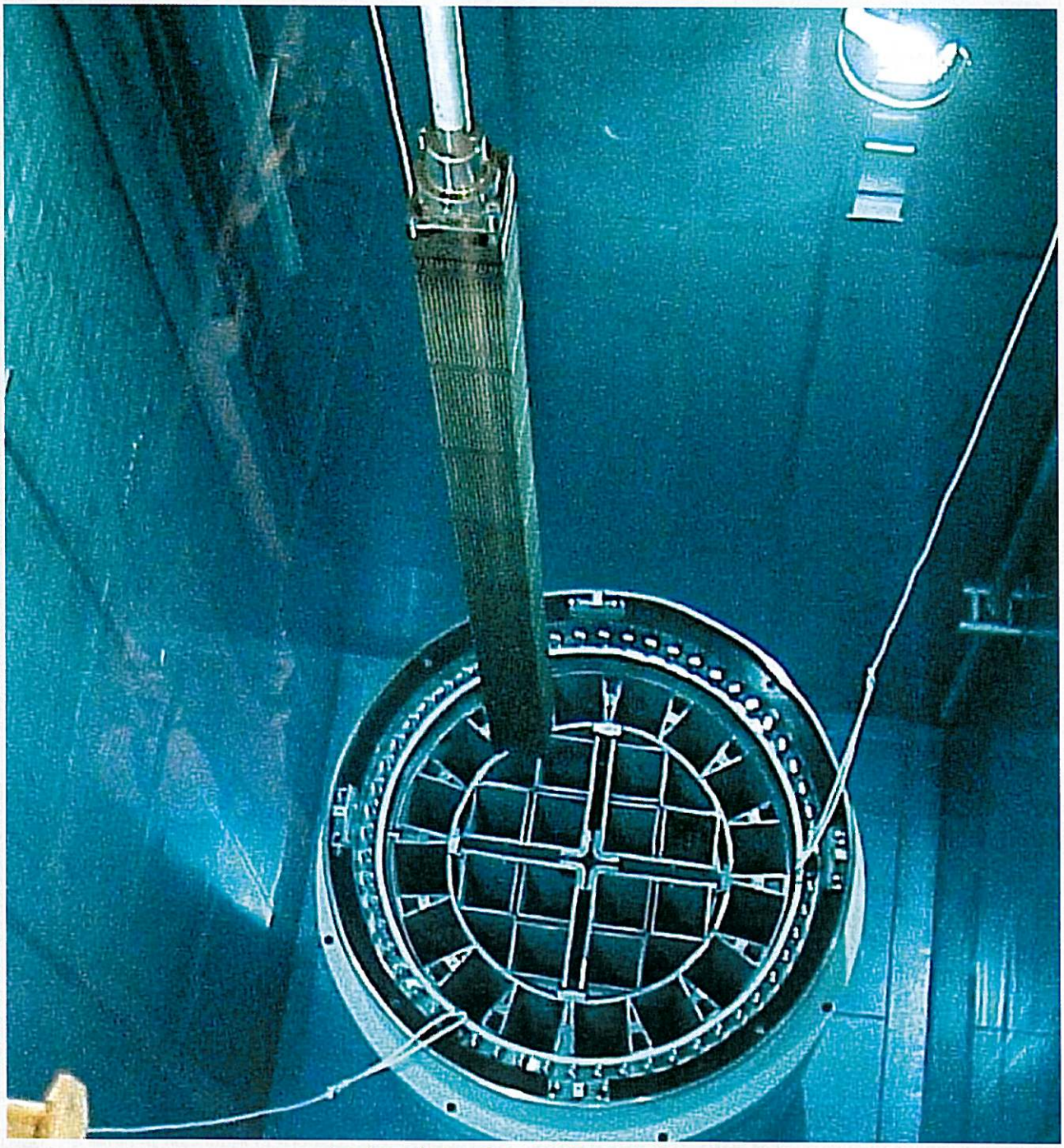
The reporting and follow-up of problems, occurrences and events at Koeberg represents a thorough, fully procedurised and ongoing process of investigation. The duration of investigation until final closeout may vary from a few weeks to several months in some instances, depending upon the extent to which complicating factors are encountered.

For the year 2000 a total of 622 Koeberg events were reported. Nine of these were regarded as significant in terms of Koeberg reporting criteria (but rated at INES level 0) and one was reported as an INES level 1 event. The overwhelm-

ing majority of these events were insignificant (below the INES scale). The INES level 1 event was the racking-out of a wrong electrical breaker, leading to the temporary loss of defence in depth. Although the NNR assessment was that this event did not have a significant impact on nuclear safety, corrective actions to prevent recurrence were identified and implemented.

The high number of reported occurrences is seen as evidence of a healthy, open reporting culture, which is a necessary prerequisite for effective experience feedback. In terms of WANO safety indicators, which predominantly reflect performance rather than safety, Koeberg's performance is good compared to that of similar installations in other countries. Koeberg surpasses EDF plants in 8 out of 11 of these indicators.

The NNR maintains an independent system of safety indicators closely linked to nuclear safety. In terms of these indicators, two areas of concern are the frequency of human error and lack of attention to detail, particularly in implementing changes to procedures, which may be ascribed partly to human resources, financial constraints and safety culture. Identified safety concerns are discussed with Eskom for resolution, at monthly "Safety Assurance Group" meetings and bi-monthly executive meetings.



Loading of spent fuel assemlies in storage cask

Nuclear installation licence application

The South African National Nuclear Regulator (NNR) has received a nuclear installation licence application from Eskom (the South African electricity utility), lodged in terms of the National Nuclear Regulator Act, Act No 47 of 1999, for the prospective siting, construction, operation, decontamination and decommissioning of a demonstration unit of a110 MWe electricity generating power station making use of the high-temperature gas-cooled Pebble Bed Modular Reactor-type design (PBMR). The application is in line with the South African Government's decision of 12 April 2000 whereby approval was given to Eskom to proceed with a detailed feasibility study (DFS) for the PBMR project



Dr M. Mysen
Manager: PBMR

PBMR licensing requirements

In order to determine if the PBMR is licensable, it was necessary to clearly identify the licensing requirements for such a power reactor and to elaborate the processes that must be undertaken to demonstrate compliance with the requirements.

The "Basic Licensing Requirements for the PBMR" have been developed by the NNR and issued to the applicant (Eskom).

In order for the applicant to demonstrate that the reactor will be acceptably safe, it is required that it demonstrate that the design and operation of the reactor:

- respects good nuclear safety design practice,
- will make use of appropriate internationally recognised design and operational rules, and
- will comply with the risk and radiation dose limitation criteria laid down by the NNR.

This broad philosophy was applied to the licensing of South Africa's first nuclear power station (the Koeberg Nuclear Power Station), which has been operational since 1984.

Of prime consideration with regard to good nuclear safety design practice, are the principles of defence-in-depth and of ensuring that risks and radiation doses to members of the public and workers will be maintained as low as reasonably achievable (ALARA), below laid down radiation dose limits.

The principle of defence-in-depth requires that there should be multiple layers (structures, components, systems, procedures, or a combination thereof) of overlapping safety provisions. Accident prevention and accident mitigation are natural consequences of the defence-in-depth principle.

Application of the ALARA principle involves the selection of design and operational features that provide the optimum level of safety. The process involves the use of one of a range of simplistic to complex techniques.

The licensing process adopted requires the applicant to identify all events that will be associated with the normal operation of the reactor, which will or could give rise to radiation exposure to workers or members of the public. The design of the plant must be demonstrated to ensure that such exposures will not give rise to the applicable dose limits being exceeded and will be maintained as far below these limits as reasonably achievable through the optimal provision of engineered and operational safety features. In undertaking the assessment to demonstrate compliance with dose limits, conservative assumptions must be used.

The applicant is also required to identify all those events associated with the design which could reasonable be anticipated to be possible and which may give rise to accidental exposure of workers or members of the public .The applicant must demonstrate that such events will either be prevented from occurring or that the design will mitigate the consequences such that radiation doses will not exceed laid down criteria and will not give rise to any serious off-site radiation hazard. Again, conservative assumptions must be made in this assessment.

Any other events that can be identified with very low probability of occurrence or complex events of equally small likelihood which could give rise to accidental exposure, must also be identified. A probabilistic risk assessment must be conducted, which includes these and the other events identified above, and a demonstration must be provided that the risk from the reactor will comply with the criteria laid down for workers and members of the public. It is acceptable for best estimate assumptions to be made for this assessment.

It is incumbent on the applicant to identify the events and to provide a justification for their selection and classification.

In addition to demonstrating that the reactor will be safe in terms of meeting good design and operational requirements and will comply with the risk and radiation dose criteria, the applicant must also demonstrate that the radioactive waste arising from the operation and decommissioning of the reactor will be safely managed. This requires all sources of waste to be identified and characterised and that the design makes provision for the collection and treatment of the waste, for

control over effluent discharges and for the safe storage of waste at the facility. The adequacy of these proposals will be evaluated against prevailing internationally endorsed standards for radioactive waste management.

The applicant must also demonstrate that adequate arrangements will be in place to deal with any accident that may occur. The arrangements must enable the operator to recognise the occurrence of an accident or incident, which may degrade levels of safety. Accident management procedures will be required to minimise the consequences of any accident and arrangements must be in place to ensure that the public and workers will be adequately protected.

The PBMR overall licensing process and planning

One of the major components of the licensing process that needs to be thoroughly considered, is the credibility of the PBMR design basis. Unlike Light Water Reactors (LWRs) such as the Koeberg Nuclear power Station design, for which well-researched and documented design criteria and rules are readily available, broad international consensus has not been developed on the general design criteria and design rules for the PBMR. Although High-Temperature Gas-Cooled Reactors (HTGR) of similar design have been licensed and operated elsewhere in the world, no international "off the shelf" package is available for defining the design basis of the PBMR. The establishment and documentation of the PBMR design basis is thus an important step of the licensing process and is currently receiving major attention by the designers, applicant and the NNR.

In order to demonstrate that the PBMR design will meet the necessary licensing requirements, a structured process for developing the PBMR safety case has been agreed between Eskom and the NNR. This process also provides a logical link between the various steps of the design process, the safety assessment and the development of operational support programmes.

Nine major elements, briefly explained below, have been identified for the development of the PBMR safety case.

- **Safety philosophy:** The key safety objectives and fundamental safety principles on which the PBMR will be designed, constructed, commissioned, operated and ultimately decommissioned are defined.
- **Quality assurance:** Over its entire lifecycle is the PBMR must be supported by a quality management system.
- **Plant technical description:** Presentation of the PBMR plant technical description and key safety characteristics.
- **Licensing basis events:** Identification, classification and analysis of all potential challenges (events) to the plant that could give rise to radiation exposure to workers or members of the public.
- **General Design Criteria (GDC):** Identification and development of the General Design Criteria against which the plant will be designed to prevent/mitigate the consequences associated with the identified events.
- **Classification of Systems Structures and Components (SSCs):** Present the safety classification of the plant SSCs to provide the rationale for determining the relative stringency of design requirements and rules applicable to the SSCs as derived from the above GDC.
- **Design rules:** Development of the set of rules, codes and standards which will be applied to the PBMR design, construction, commissioning, operation and maintenance.
- **Safety Assessment:** An appropriate safety assessment must demonstrate that the PBMR design is in line with the PBMR fundamental safety design philosophy and meets the associated regulatory requirements.
- **Supporting Programmes:** As derived from the safety assessment, a set of operational programmes, e.g. General Operating Rules (GORs) is developed to support the operation of the PBMR.

Current status of the PBMR licensing

The NNR review of the PBMR nuclear installation licence application is in progress following the licensing framework described above. No nuclear installation licence has been issued.

International liaison on PBMR

At the onset of the PBMR project the NNR recognized that in order to undertake the necessary work associated with the licensing of the PBMR, it was necessary to bolster the NNR staff, whose current expertise is more focused on Light Water Reactor (LWR) technology as opposed the High-Temperature Gas-cooled Reactor (HTGR) technology of the PBMR. The NNR identified organizations in the USA, Germany, France, Japan and the United Kingdom which are able to provide technical services to the NNR and also pass their expertise to the NNR staff.

Furthermore during a visit to the NNR offices by a joint delegation from the US Department of Energy (DOE) and the US Nuclear Regulatory Commission (USNRC), the NNR had some initial discussions with the USNRC to engage in co-operation, within the current framework of the USNRC/NNR bi-lateral agreement, on the licensing of the PBMR, as it has been approached by EXELON , the US partner in the PBMR company, to initiate a review of the licensibility of the PBMR in the USA.

The NNR is also actively involved in an International Atomic Energy Agency (IAEA) consultancy working group which is developing an international standard on the safety and licensing aspects of HTGRs .

The NNR also actively participated in an independent international review of the safety aspects of the PBMR, requested by the Department of Mineral and Energy as part of the PBMR Detailed Feasibility Study (DFS), carried out by a team under the auspices of the IAEA.

Koeberg Nuclear Power Station

Shipments of radioactive waste to the Vaalputs nuclear waste storage site in 2000 involved volumes of 77,7 m3 of metal drums and 8,2 m3 in concrete drums.

Certification of transport containers

During this period the NNR, as the national competent authority in connection with the IAEA's Regulations for the Safe Transport of Radioactive Material, issued the following certificates:

ZA/004a/S	July 2000	NECSA Iridium Container
ZA/NNR/19/X	July 2000	NECSA Co-60 Teletherapy Isotopes
ZA/NNR-20/X	March 2000	MCC-3 Westinghouse Fresh Fuel for Eskom
ZA/NNR/1008 B(U)	Dec 2000	"JANE" Container for NECSA
ZA/NNR/1009/B(U)	Dec 2000	"ERIKA" Container for NECSA

Occurrence related to transport of radioactive material

R48 transport cask incident

To monitor any deterioration of the Reactor Pressure Vessel steel at Koeberg, a series of samples are being tested in the hot cell laboratories in Chinon, France.

In 2000 a capsule containing steel samples was shipped to France in a R48-type cask. The cask conformed to the Type A package requirements of the current IAEA transport regulations. It is routinely used in France for the transport of capsules and was specifically designed for that purpose. It should be noted that Type A packages are exempt from certification by the local competent authority for radioactive transportation which, in this case, is the NNR.

The capsule containing the specimens was loaded into the cask, using approved procedures. The only deviation was that, due to an incompatibility of connectors, the cask was not blown out with pressurized air. The cask was decontaminated and surveyed for radioactivity prior to shipping. The contamination and radiation levels complied with international requirements as specified in the IAEA transport regulations and the cask was labelled accordingly.

The cask was transported to Cape Town harbour where Safmarine placed it on an open flatrack and the consignment was shipped to Zeebrugge (Belgium).

When the cask was offloaded from the ship at Zeebrugge the transport company, as per procedure, surveyed the package to verify contamination and radiation levels. It was found to have significant contamination levels. The type of contamination suggested that the nuclear power station was the origin. The flatrack was more heavily contaminated than the cask. The transport truck used to convey the cask to Cape Town harbour was surveyed and found not to be contaminated.

Following transportation to Chinon the cask was dismantled. The quantity of water inside the cask was found to be normal for this type of shipment. The seals were inspected and found to be intact. The gaskets and O-rings were not damaged in any way. It was concluded that the integrity of the cask was not in question.

It was suspected that the outer surface of the cask, although thoroughly decontaminated, contained contamination fixed in the outer metal or oxide surface layer and that this contamination migrated to the surface during the passage from Cape Town to Europe. Normally the cask is used only for local transport in France. The cask could also have been exposed to the elements and to condensation during shipping. This could have dripped onto the flatrack during shipment, resulting in its contamination.

This migration of radioactivity is a known phenomenon in the nuclear industry. The IAEA does not see this phenomenon as a problem due to the conservative assumptions in deriving the applicable limits, as long as the necessary care is taken during decontamination.

For future transportation, Eskom will investigate means to prevent the migration of contamination to the surface and/or to prevent it from spreading to the public domain. Although the levels of contamination were very low and were dealt with immediately when found, the public outcry on this matter has the potential to be serious and needs to be considered.



G F A Pretorius, Acting Manager: NTWP

THE SA NUCLEAR ENERGY CORPORATION LTD (NECSA)

Prior to 24 February 2000 the then Council for Nuclear Safety (CNS) and Atomic Energy Corporation (AEC) were governed by the same Act, the Nuclear Energy Act, Act No 131 of 1993. From 24 February 2000 the two organisations have been known as the National Nuclear Regulator (NNR) and the South African Nuclear Energy Corporation Limited (NECSA) respectively, and are governed by two different pieces of legislation. The NNR is governed by the National Nuclear Regulator Act, Act No 47 of 1999 and NECSA is governed by the Nuclear Energy Act, Act No. 46 of 1999.

SAFETY ASSESSMENT

The NNR approved 97 licence change requests by NECSA during the reporting period. The following table indicates the areas covered by these licence change requests.

NECSA submissions approved by the NNR during 2000/1

Safety assessments	42
Facility operational technical specifications	7
Facility in-service inspection manuals	1
Radiation protection standards	25
Facility security manuals	6
Facility quality management manuals	3
Facility care and maintenance procedure	1
Transport containers (also revalidation of certificates)	5
Facility decommissioning & decontamination procedures	7
Total	**97**

The most significant projects were:

- Laboratories for fuel manufacturing and testing and kernel coating for the proposed Pebble Bed Fuel Manufacturing Facility
- Processing of Phosphorus-32 and Sulphur-35 in the Hot Cell Complex
- The process and equipment description of the facility for the storage and machining of Depleted Uranium metal (UMET)
- METOX Phase 1 dissociation pilot plant

SAFARI-1 SAFETY RE-ASSESSMENT

The safety re-assessment of the SAFARI-1 Research Reactor on the NECSA site continued during the reporting period and is scheduled to be completed during the 2001/2 reporting period.

SMELTER

In February 2001 NECSA submitted an application for a nuclear installation licence for a production smelter.

Originating from NECSA's previous operations, approximately 14 000 tons of uranium-contaminated scrap metal is presently stored on the Pelindaba site. The greater portion of this metal consists of about 36 000 separation elements, which in accordance with non-proliferation agreements, should be destroyed completely. NECSA regards melting as the most appropriate and cost-effective method to achieve this.

The remainder of the uranium-contaminated scrap metal mentioned above cannot be decontaminated by conventional chemical means. NECSA has indicated that due to the form and volume of this scrap metal, it is not economical to store such equipment indefinitely or to dispose of it in the appropriate manner.

A process of public participation was initiated in the first quarter of 2001 and it is envisaged that this process will be completed within the next reporting period.

PBMR FUEL PLANT

In July 2000, NECSA submitted an application for a nuclear installation licence for the proposed manufacture of nuclear fuel spheres as well as non-fuel graphite spheres for the proposed Pebble Bed Modular Reactor.

The proposed plant will entail a production capacity of 3,5 tons of uranium or 80 tons of fuel spheres and 80 tons of graphite spheres a year. It is proposed that the manufacturing plant be constructed in the buildings previously licensed and used for the manufacture of nuclear fuel for the Koeberg Nuclear Power Station.

A process of public participation was initiated in the first quarter of 2001 and it is envisaged that this process will be completed within the next reporting period.

The NNR has commenced with a review of the design proposals. The safety assessment is still under consideration and a nuclear installation licence had not been issued by the end of the reporting period.

CONDITIONS OF AUTHORISATION

The conditions of authorisation were reviewed. These conditions refer to a number of more detailed NNR licence documents. As a result of the review, the licence document on occurrence reporting was revised and a licence document on quality management was prepared for inclusion in the licence.

COMPLIANCE ASSURANCE

INSPECTIONS AND AUDITS

NNR inspectors performed a total of 245 compliance inspections on the NECSA site during the reporting period. These inspections covered all aspects of the licensing conditions and also included 14 NECSA radiation protection audits in which the NNR participated. The NNR also observed the emergency planning exercises held on the NECSA site during the reporting period.

ROUTINE REPORTS

Routine reports were submitted to the NNR in respect of the following:

- Effluent discharges
- Environmental surveillance
- Meteorological data
- Waste handled by Nuclear Waste Management Services
- Facilities sealed sources register
- Shielding verification programmes

The reports received were evaluated by the NNR. During the review of the NECSA liquid effluent report for the 1999 calendar year, concern was raised about the effluent management system. The end result was the reporting of an occurrence on exceeding the annual authorised discharge quantity (AADQ) for liquid effluent releases. (Further detail on this occurrence is presented later in the report.)

EMERGENCY PLANNING

NECSA has a comprehensive emergency plan that forms part of its nuclear licence. In accordance with the approach adopted in 1998, various aspects of the plan are tested during exercises held on a two-monthly basis. Six site emergency exercises and 63 building exercises were held during this reporting period.

A comprehensive exercise was held in November 2000. The main objective of this exercise was to evaluate the evacuation of personnel from all buildings on site and to test the communication between the Emergency Control Centre (ECC) and the building heads.

No major deficiencies were identified in the emergency plan during the reporting period.

OCCURRENCES

A total of 91 occurrences were reported during the reporting period. The most serious occurrences were exceeding the annual authorised discharge quantity (AADQ) for the 1999 calendar year (see more detail later in the report) and the theft of two molybdenum transport containers.

During the routine transportation of radioactive isotopes between Pelindaba and Johannesburg International Airport for onward dispatch to other countries, two containers (Type B(U) and Type A containing 225 Curie(Ci) and 10 Ci Mo-99 respectively) were reported stolen.

The Explosives Unit of the South African Police Services is investigating the thefts. Due to the short half-life of Mo-99 (66 hours), the activity decays rapidly and as such does not pose a danger after approximately 30 days.

Following the theft, the NNR directed NECSA to ensure an armed escort for all shipments of Type B(U) containers between Pelindaba and Johannesburg International Airport.

OCCUPATIONAL EXPOSURE

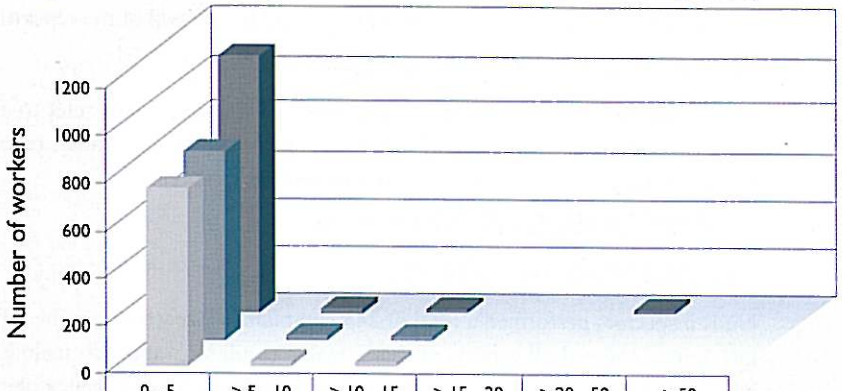
The controls over occupational exposure were comparable to the best practice internationally and well within the ALARA objectives set by NECSA. The average effective radiation dose per occupationally exposed worker for 2000/1 was 0,658 mSv, which is 13% of the ALARA objective of 5 mSv/a. The maximum exposure was 11,7 mSv/a, which is down from 14,9 mSv during the previous year and well below the annual limit of 50mSv.

The following figure details the dose distribution for the past three years.

PUBLIC EXPOSURE

As previously mentioned, concerns were raised over the NECSA liquid effluent management system. The NNR conducted a detailed investigation into the matter and NECSA was required to undertake its own investigation and implement appropriate corrective actions. These investigations led to the conclusion that the annual authorised discharge quantity (AADQ) for liquid effluent releases had been exceeded in the 1999 calendar year.

Figure 3: Dose to all workers 1998 - 2001 (Occupational Exposure)



	0 - 5	> 5 - 10	> 10 - 15	> 15 - 20	> 20 - 50	> 50
Number of workers 2000/2001	751	20	3			
Number of workers 1999/2000	791	18	6			
Number of workers 1998/1999	1077	21	3		1	

Dose range (mSv/a)

Despite this excess, the safety margins adopted during the derivation of the AADQ values ensured that no overexposures occurred. The calculated dose as a result of NECSA's liquid effluent releases for the 1999 calendar year was of the order of 0,18 mSv compared to the annual dose limit of 0,25 mSv. The environmental verification programme undertaken by the NNR also did not indicate any contamination of the environment.

Table 3 gives a summary of the NECSA liquid discharges and the resulting dose for the past three years.

TABLE 3 : SUMMARY OF LIQUID DISCHARGES AND RESULTING DOSES

Calendar year	Total activity released	% of AADQ discharged	Public dose due to discharge (mSv/a)
1998	12,8	51,2	0.065
1999	66,8	267,20	0.18
2000	19,2	76,8	0.097

Table 4 gives a summary of the gaseous discharges and resulting doses for the 2000 calendar year

TABLE 4: SUMMARY OF GASEOUS DISCHARGES FOR THE 2000 CALENDAR YEAR

Gaseous discharge type	% of AADQ discharged	Public dose due to discharge (µSv/a)
Uranium	3,11	6,47E-05
Alpha activity as Pu-239	2,35	2,30E-06
Beta activity as Sr-90	0,36	5,76E-07
Iodine activity as I-131	27,30	4,37E-03
Noble Gas as Kr-85	0,26	5,20E-05
Tritium	0,01	1,10E-08
Total		4,49E-03

ENVIRONMENTAL VERIFICATION

In compliance with licence requirements, various sample media are collected from the environment around the Pelindaba site. The sampling locations are based on the surrounding land use. Samples are analysed and results are submitted to the NNR on a quarterly basis.

In addition to the above programme undertaken by NECSA, the NNR conducts an independent environmental verification programme, the primary objective of which is to provide an independent determination of the levels of radioactivity surrounding the Pelindaba site. The environmental verification programmes confirmed adequate control over effluent discharges during the period under review.

DISMANTLING AND DECOMMISSIONING (D&D) ACTIVITIES

Because of the downscaling of activities on the NECSA site, operations at a number of facilities have been discontinued. Subsequent to such discontinuation, D&D activities are performed in three different phases:

1. Phase1 D&D covers facility shut down and minimum decommissioning activities such as the removal of the radioactive inventory to obtain a state of passive safety.

2. Phase 2 D&D covers further decommissioning activities for the partial or complete removal and decontamination of process systems with the aim of restricted re-utilisation of facilities or reducing care and maintenance requirements.
3. Phase 3 D&D covers the activities required for the clearance of facilities. Phase 3 decommissioning is the ultimate end point of decommissioning, after which a facility could be removed from regulatory control.

During the reporting period the following D&D activities were approved by the NNR :

- Phase 1 decommissioning of the Conversion Plant
- Phase 2 decommissioning of J-Building
- The decommissioning strategy for Phase 2 decommissioning of the XB-Building
- The hazard assessment for the decommissioning of some facilities in Bay 1 of 2700

TRANSPORT

During the reporting period sixteen 12-ton containers containing natural UF6 were exported to an overseas client.

NECSA also manufactured medical and industrial isotopes that were transported off-site to local and overseas clients.

The equipment from the BEVA plant that was sold to an overseas client was transported off-site in accordance with NNR-approved documents.

RADIOACTIVE WASTE MANAGEMENT

Seventy-two containers of short-lived radioactive waste from the molybdenum production process were transferred into storage from the Hot Cell Complex. Short-lived radioactive waste received during the year from hospitals, research institutions, medical doctors and universities amounted to 276 containers (100-litre drums). At the end of the reporting period, 340 SAFARI-1 spent fuel elements were stored in the Pipe Storage Facility at Thabana.

VAALPUTS NATIONAL RADIOACTIVE WASTE REPOSITORY

Assessment

Seven licence change requests were submitted by Vaalputs, of which six were approved during the reporting period.

The most important areas covered by these submissions were:

- Environmental monitoring programme
- Revised waste acceptance criteria
- Revised safety assessment for Vaalputs

The waste acceptance criteria were revised to be comparable with international best practices.

A schedule was also submitted to the NNR to address the long-term safety case of the repository, including the post-closure assessment for the disposal of Koeberg Low and Intermediate Level Waste (LILW).

Compliance assurance

The NNR participated in both the annual internal radiation protection and quality management audits at the Vaalputs site. Both audits showed an improvement in the management of the repository.

In respect of the occurrence reported on the cracking of the concrete drums at the Vaalputs repository, NECSA and the waste generator jointly appointed an independent inspection team of experts in the field of reinforced concrete, to conduct an on-site inspection of the cored drums. The team cited the following possible reasons for the drums' cracking:

1. The adverse environmental conditions at the repository (which now requires the waste containers to be covered as soon as possible after placement in the trenches).
2. Quality aspects related to the drum manufacture, filling and capping process.

Due to the underlying problems with the concrete containers, NECSA, which is the operator of Vaalputs, in consultation with the NNR and the waste generator, decided to suspend the shipment of waste to Vaalputs until such time as compliance with the revised waste acceptance criteria has been demonstrated to their satisfaction.

Prior to the suspension of waste shipments to Vaalputs, 24 concrete drums of intermediate level waste and 480 metal drums with low-level waste were transported to Vaalputs.

Environmental monitoring

Although no radioactive effluents are discharged from the Vaalputs site, an environmental monitoring programme is conducted to confirm that there have not been any releases into the environment. Routine environmental monitoring on and around the Vaalputs site has been done since 1984. Due to the climate of the area, the programme is mainly restricted to borehole water, soil and vegetation monitoring.

One quarterly borehole sample in the third quarter had a Cs-137 concentration higher than the analytical detection limit. Four extra samples of that borehole were taken in the fourth quarter, but none of them showed any Cs-137 activity higher than the detection limit.

From the monitoring results it can be concluded that no measurable radiological impact could be detected from the activities at Vaalputs.

SAFETY ASSESSMENT

Since the regulation of radiation hazards associated with the mining and minerals processing facilities commenced, considerable progress has been achieved with regard to the identification and quantification of such hazards. The two areas covered in this regard are exposures to the public and to workers.



Mr M.M.E.G. Khoathane
Manager: MIMP

Public safety

In order to determine control measures which are necessary to protect the public against radiation hazards, holders of nuclear authorisations were required to conduct hazard assessments identifying and quantifying radiation exposure levels received by members of the public. These hazard assessments, which were due by December 1998, had been received from holders. To date the NNR has also received approximately 90% of the public radiation protection programmes, which were due by April 2000. The outstanding submissions are mostly from facilities which were authorized after 1997, and these are expected during 2001 and 2002. The assessments and radiation protection programmes were reviewed by the NNR and comments were sent to the holders.

Workers' safety

In terms of the workers' safety assessments, the NNR has received all hazard assessment reports. Following these assessments, holders were required to establish radiation protection programmes. To date the NNR has received approximately 80% of these programmes and the outstanding submissions are expected during the next reporting period.

Assessments conducted at unauthorised facilities

The NNR has over the years conducted its own investigations regarding the radiation hazards at some of the facilities where radiation hazards may be prevalent. The facilities included zircon processors, facilities where activities involving thorium-bearing alloys used in the aviation industry are undertaken, water treatment facilities, oil and gas facilities, coal burning power stations as well as facilities associated with building materials and the phosphate industry. A working group has been set up to address issues related to the phosphate industries. With regard to the zircon facilities, meetings have been held with the Zirconia Minerals Committee and significant progress has been made towards the establishment of a working group in this regard. In view of the considerable effort and resources required to cover all these facilities, the NNR is considering ways in which investigations of all these facilities can be resourced.

CONDITIONS OF AUTHORISATION

No nuclear authorizations were issued during the reporting period. The NNR has nevertheless received a number of applications for authorizations, but these could not be processed due to uncertainty associated with the promulgation of the National Nuclear Regulator Act (Act No 47 of 1999). The number of mining and minerals processing facilities, users of small quantities of radioactive material and scrap recyclers authorised by the NNR are shown in the table below.

Holder in the category	
Mining and minerals processing facilities	60
Small users	23
Scrap recyclers	9
Total	92

Licence Change Requests (LCRs)

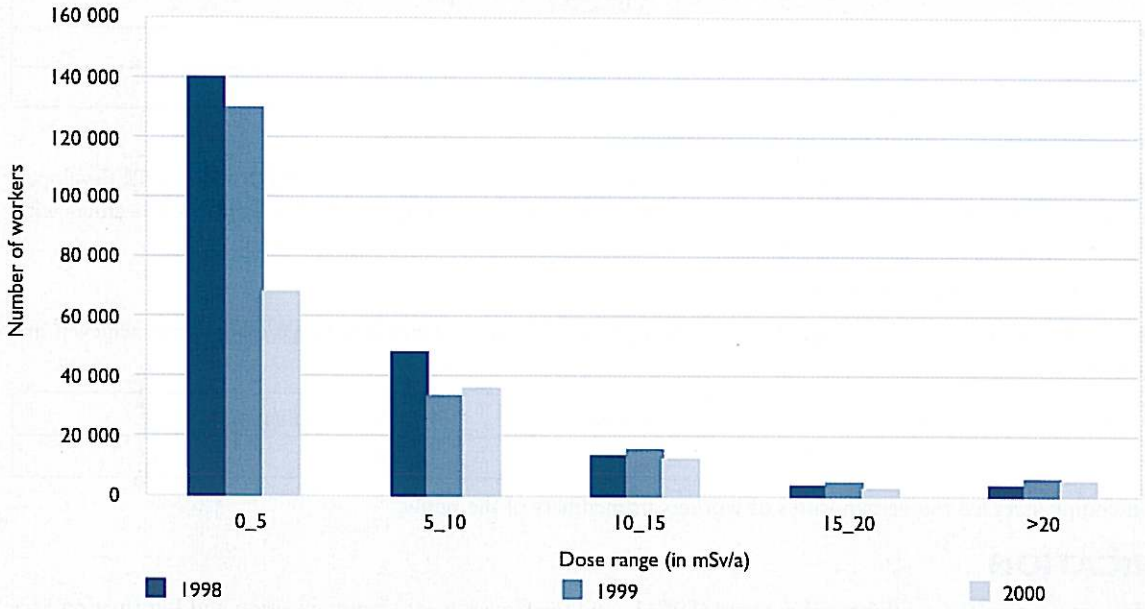
Seventy-one Licence Change Requests (LCRs) were approved during the reporting period, involving procedures and programmes required in terms of licence conditions.

COMPLIANCE ASSURANCE

Worker exposure

Figure 4 represents a distribution of doses reported by holders in their 1999 and 2000 annual dose reports.

Figure 4



As can be seen from Figure 4, the total number of workers exposed to radiation hazards has reduced considerably, in particular, those receiving a dose of between 0 and 5 mSv/year. This is mostly attributable to the reduction of the workforce in the various facilities due to retrenchments. The number of workers exceeding dose limits does not seem to have changed considerably. The table below compares the numbers of these workers during the past two financial years.

2000/2001	1999/2000
4884	5427

As can be seen from the table, the number has slightly decreased. For the mines where workers exceed dose limits, namely, Harmony Gold Mine, Randfontein Estates Gold Mine and Nigel Gold Mine, working groups have been established in an effort to find ways in which doses to the workforce can be reduced. The working groups include representatives of management and labour, the NNR, the Department of Minerals and Energy as well as independent specialists. To date the activities of these working groups has yielded encouraging results in terms of dose reductions. It is expected that by 2002 no worker will be exceeding the dose limit.

Public exposure

The public hazard assessment reports indicated that doses to members of the public from mining and minerals processing facilities were generally in the range of 0.25 mSv per annum to 1 mSv per annum. The 0.25 mSv per annum is the NNR dose limit from a single site and the 1 mSv per annum is the internationally accepted limit for the cumulative dose from all sites. The implementation of radiation protection programmes should lead to a reduction in the doses and should also assist in generating improved information on the doses to members of the public.

Transport of radioactive material

The table below contains the quantities of radioactive material transported from the various licensed facilities during 2000. No accidents involving the transport of radioactive material were reported.

Material	2000
Scrap metal	2 361 855
Ammoniumdiurinate (ADU) slurry	2400
Baddelyite	4634
Zirconia	3448
Fused silica	1186

Radioactive waste generated

As per their conditions of authorisations, holders are required to report on the quantities of waste generated. The table below provides the quantities generated during 2000.

Type	2000
Scrap metal	3 074 511
Waste rock	13 452 300
Slimes	131 793 400

Control over radioactively contaminated scrap metal

The illegal trafficking of radioactively contaminated scrap metal remained a major concern of the NNR. The NNR developed a document on this topic during the reporting period. The development of this document involved a number of meetings with stakeholders and the review of international literature.

Inspections and audits conducted and findings

The number of compliance inspections conducted during the reporting period and the percentage compliance achieved are shown in the table below.

Undertaken	Compliance	Non-compliance	% Compliance achieved
182	150	32	82

None of the non-compliances led to overexposures of workers or members of the public.

COMMUNICATION

The NNR, the Department of Water Affairs and Forestry (DWAF) and the Government Communication and Information Service (GCIS) undertook a tour of the Northern Cape, during which members of the public were informed of radioactivity from natural sources. This information session was attended by local authorities, community representatives and political parties.

The NNR also held meetings and a workshop with DWAF in an effort to promote the implementation of the NNR-DWAF guideline for co-operation. These meetings involved NNR inspectors and DWAF regional officers, who deliberated on issues for co-operation and how this could be achieved.

RESEARCH INTO BACKGROUND RADIOACTIVITY AND RADON CONCENTRATION LEVELS

The primary function of the NNR in terms of the National Nuclear Regulator Act is the protection of persons, property and the environment against nuclear damage, through the establishment of safety standards and regulatory practices.

In executing its mandate, the NNR has to endeavour to remain relevant. Quoting the Minister of Minerals and Energy: "As an organisation you need to consistently be striving to remain relevant. This means that you need to take cognisance of the environment (socio-economic) within which you operate and adjust your strategies accordingly. There needs to be preparedness to respond to new challenges so that when a player wants to introduce new technology, as a regulator you prepare yourselves to deal with that. The impact of the various legislation on your activities must be anticipated before they reach crisis situations..."

Research and development is seen as a necessary tool to enable the organisation to remain relevant.

The NNR's research work focuses on the following issues:

- Safety standards
- Regulatory requirements and methodologies
- Closure and post-closure requirements

During the past year, work relating to safety standards was initiated. This research work specifically addresses issues of background radioactivity concentration in soil and water, and radon concentration levels, indoors and outdoors.

To assist the NNR in this endeavour an advisory body, the Technical Working Group, provides technical and scientific input on the selection and design of research projects, and on the adjudication and implementation of research proposals related to the projects.

The Technical Working Group is comprised of NNR representatives and scientific and technical specialists in relevant fields and industries.

A two-stage approach was adopted to undertake research projects on background radioactivity levels in the country. The first stage was to collate all available data in South Africa. The outcome of this stage will be to put together a database of all research that has been done in South Africa in this field and also to identify possible gaps. The results of this phase will inform the second phase, which entails addressing the gaps where such have been identified.

Tenders were awarded to two organisations for the first phase of the research projects. ALARA Consultants cc was awarded a tender to collate work on the background radioactivity levels in soil and water. PARC Scientific was awarded a tender to collate work on radon concentration levels, indoors and outdoors.

The volume of data on radon concentration levels in South Africa was identified as being very sparse and thus the second phase of this project has already commenced. The design of a national survey strategy on radon concentration levels was commissioned.

Completion of the ongoing projects is expected before the end of the current financial year. Research work will be initiated in the other focus areas during the coming financial year.

SAFETY STANDARDS AND REGULATORY PRACTICE

Regulations on safety standards and regulatory practice as contemplated in section 36 of the National Nuclear Regulator Act, Act No 47 of 1999 were developed for consideration by the NNR Board. A process involving representatives of a range of stakeholders was established to resolve the controversial and complex issues that were raised during the Board's deliberation on the regulations. The Board subsequently approved the regulations for recommendation to the Minister of Minerals and Energy.

NNR ACT A NEW DIMENSION IN LEGISLATION



Rodney Elk:
Legal Advisor

The National Nuclear Regulator Act (Act No 47 of 1999) (NNRA), which was promulgated in December 1999, came into force on 24 February 2000.

All nuclear legislation prior to the NNRA was developed with a view to the regulation of nuclear installations within the nuclear fuel cycle. The promulgation of the NNRA has progressed the regulation of the nuclear industry and the use of radioactive material to its next phase through the creation of different nuclear authorisations for nuclear installations and nuclear vessels on the one hand and other uses of radioactive material and activities that could give rise to exposure to ionising radiation on the other hand.

The Act has also introduced a new dimension with regard to the composition of the Board of Directors of the NNR, by including representation from formal business, organised labour and affected communities.

The establishment and prescription of safety standards and regulatory practices as a formal requirement in the Act has been welcomed by both the regulator and interested and affected parties. Workshops were held with all stakeholders with a view to formulating a recommendation for submission to the Minister, and a formal written recommendation has been prepared.

Negotiations are also taking place with a view to determining the fees payable to the NNR in respect of applications for nuclear authorisations and annual authorisation fees as contemplated in the legislation.

South Africa's nuclear legislation is now in line with that of many of the other international nuclear states through the inclusion of a provision to include the protection of the environment against nuclear damage amongst the objects of the NNR.

The transformation in respect of the regulation of the nuclear industry from the Nuclear Energy 1993 to the NNRA is being implemented and considerable progress has been made in addressing the statutory provisions of the NNRA, which will enable total implementation of that legislation.

COMMUNICATION AND LIAISON

Schools Project



Phil Nkhwashu
Manager: Communication and Liaison

As a matter of vital importance to providing the next generation of workers in the nuclear industry, and as its social responsibility to the present generation of high school learners, the NNR embarked upon a schools scientific information project during the report year.

The project, which targeted Grade 10, 11 and 12 learners, commenced with a pilot meeting with science teachers from five provinces who attended a Science Week in Mmabatho, North West Province.

Significant input was received from the teachers, who shared ideas with NNR staff on ways in which the project should be structured.

The purpose of the project is to encourage learners who take science amongst their range of subjects and who find this subject stimulating and interesting, with opportunities to visit a number of facilities in the nuclear industry and thereby gain first-hand experience of the industry's activities.

It is hoped that, out of this exposure, learners with the appropriate aptitudes will pursue their tertiary studies in this direction and ultimately seek employment in the nuclear industry.

Not only will the project provide learners from the previously disadvantaged sections of the population with the necessary educational base on which to make informed decisions on their career paths and build their career development capacity, but the human resources development of the nuclear industry will also thereby be sustained in coming decades.

The 2000 project required learners to relate the story of the discovery of uranium, its uses and what ultimately happens to the radioactive waste materials. The project was concluded with a prize-giving ceremony in Centurion, at which all schools judged to have met the criteria were invited to present their theoretical submissions to a panel of judges. The winners were selected and named during the ceremony.

The project is to be conducted annually, and is expected to make a significant contribution to South Africa's nuclear industry in the years to come.

Annual lecture

The NNR regularly invites prominent international lecturers to address stakeholders in the South African nuclear industry on matters of importance and current international trends in nuclear safety. The purpose of this programme is to maintain this country's standards of nuclear safety, which are based on international norms set by the IAEA and other foreign peer groups.

This year's lecture, held in Johannesburg on 16 November 2000, was delivered by Laurence Williams, Director of the UK Nuclear Safety Directorate's Health and Safety Executive (HSE). His topic: Nuclear Safety Regulation in a country with an Integrated Nuclear Energy Programme.

The event was attended by a large number of stakeholders representative of all sections of the South African nuclear industry.

In his capacity as Director of the HSE, Mr Williams is the UK's Chief Inspector of Nuclear Installations.

He holds an honours degree in mechanical engineering and a masters degree in nuclear reactor technology.

His distinguished career includes working on the design of the high-temperature gas cooled reactor, working on nuclear fuel and thermal performance of the Magnox and advanced gas cooled reactors, and on the thermal performance of nuclear fuel transport flasks.

In 1976 he joined the Nuclear Installations Inspectorate and has held a number of posts including the assessment of the safety case for PWR fuel for the Sizewell B reactor, fuel behaviour in the commercial fast breeder reactor, and the civil structure design of BNFL's THORP reprocessing plant. Prior to promotion to Director, he was Head of HSE's Nuclear and Hazardous Installations Policy Division.

Mr Williams has been involved in a number of international activities with the OECD/NEA, IAEA, the EU and the European Bank for Reconstruction and Development. He is currently the chairman of the IAEA's Commission on Safety Standards and of the International Nuclear Regulators Association.

Interaction between NNR and labour unions at Koeberg

Meetings are held with representatives of the various unions at Koeberg (namely MWU, EEA, NUM, NUMSA) approximately three times a year to discuss matters of common interest. The unions have raised a number of safety concerns, which have been taken up by the NNR with Eskom and resolved satisfactorily. The NNR has made a number of presentations to the unions on various matters such as:

- International operator training review
- Spent fuel re-racking project
- Pebble Bed Modular Reactor
- Safety culture at Koeberg
- Koeberg outages.

The unions have expressed the view that the forum is of value to them and they also expressed their willingness to assist the NNR in conveying information on nuclear and radiation safety to the local communities around Koeberg. In response, the NNR held a meeting with Atlantis residents last year, at which presentations were made and discussions held on matters such as nuclear safety, the role of the NNR, emergency planning and the Pebble Bed Modular Reactor. Follow-up meetings are planned for the future



Ms Zondo with representatives of the various trade unions at KNPS

Public participation in the authorization process

In terms of Section 21 of the NNR Act the applicant (Eskom) was directed by the NNR to serve and publish a copy of the nuclear installation licence in accordance with the requirements of section 29(3).

In terms of section 21(4) of the NNR Act, any person directly affected by the granting of a nuclear installation licence may make representations to the NNR, related to health, safety and environmental issues connected with the application, within 30 days of the date of publication in the Government Gazette. The date of publication of the application in the Gazette was 19 January 2001, so the official cut-off date to make representations to the NNR Board was 18 February 2001.

Some concerns were expressed by various organizations and members of the public that this 30-day period was too short and that the NNR should give consideration to extend it. Earthlife Africa specifically requested that it be extended to 90 days. After serious consideration the NNR subsequently extended the closing date for the public to make representations to the NNR to 18 April 2001.

Furthermore, if the NNR board is of the opinion that further public debate is necessary, it may arrange for such hearings on health, safety and environmental issues as it determines.

Taking into account the public representations received by the NNR, the NNR Board of Directors decided that such hearings would take place. The strategy and logistics for the hearings are currently being defined by the NNR.

An important point to consider is that the public representations/concerns will be taken into consideration during the NNR review of the application.

International participation

The NNR attended the international meeting of the Network of Regulators with Small Nuclear Programmes (NERS) held in Finland.

The NNR hosted visits by the Director of the UK Nuclear Safety Directorate (NSD) to discuss general regulatory matters and the Chinese delegation of the Vice-Governor of the Guangdong Province to discuss matters related to disaster management around the Koeberg Nuclear Power Station.

The NNR hosted the inaugural meeting of the Framatome Regulator's Group (FRAREG) in South Africa. National Regulators from France, Belgium, South Korea, China (unable to attend) and South Africa constitute this group.

The NNR attended the four-yearly congress of the International Radiation Protection Association (IRPA). During the congress, the Deputy-General Manager of the NNR, Mr P E Metcalf, was elected as Vice-President of the IRPA.

The NNR continued with its active participation in the Waste Safety Standards Committee of the International Atomic Energy Agency (IAEA).

International Conventions

Convention on Nuclear Safety

The Convention on Nuclear Safety (CNS) was ratified by South Africa on 24 December 1996 and is relevant to any land-based civil nuclear power plant, i.e. only Koeberg Nuclear Power Station in the case of South Africa. The stated objective of the Convention is to achieve and maintain a high level of nuclear safety worldwide, through the enhancement of national measures and international cooperation.

The Convention entails two basic commitments by each Contracting Party, namely: 1) to prepare and make available a National Report including a self-assessment of steps and measures already taken and in progress to implement the Convention obligations; and 2) to subject its National Report, and the nuclear safety programme it describes, to peer review by the other Contracting Parties, and to take an active part in that review and in the review of the Reports of other Contracting Parties.

The first review meeting of Contracting Parties was held in Vienna, Austria from 11-23 April 1999 and the first National Report of South Africa was prepared and presented by the NNR at this meeting. Comments received from other Contracting Parties indicated that the South African Report was of a high standard and very comprehensive.

Review meetings on this Convention take place on a three-yearly basis. The next meeting will be held in April 2002. The second National Report, to be presented at this review meeting, is under preparation by the NNR and requires to be submitted to the IAEA, through the official channel, by 15 October 2001.

National capacity building

The imminent recruitment of scientists, physicists and engineers to supplement the current NNR resources for the PBMR project necessitated the preparation of an adequate training programme. A post-graduate course in nuclear science, engineering and safety (addressing but not limited to the PBMR technology) was jointly developed by Eskom, the NNR, the PBMR company, NECSA, Potchefstroom University and the University of the Witwatersrand. This post-graduate course was officially opened at the University of the Witwatersrand by the Deputy-Minister Minerals and Energy, Ms S. Shabangu, on 15 January 2001 and will run until July 2001. Eighteen students are attending – 11 from Eskom and 7 from the NNR. This course will be repeated next year.

The NNR continue to provide support to the University of North Wesr for the Master's degree course in Radiation Science and Technology, by making available its senior scientists to give lectures at the university.

The NNR also continued its support for the post-graduate course in radiation protection presented by the University of the Witwatersrand. Apart from its financial support, the NNR also provided lecturers and participated in the steering committee responsible for the management of the course. During 1999 and 2000 a total of 35 students from a number of African countries including Angola, Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Liberia, Namibia, Nigeria, Sierra Leone, Sudan, the United Republic of Tanzania, Zambia and Zimbabwe successfully completed the course.

National Radioactive Waste Policy

The NNR continued its support to the Department of Minerals and Energy in the development of a national radioactive waste management policy and strategy through its participation in the working group established for that purpose.

Co-operative governance

The implementation of the guideline for co-operation that the NNR established with the Department of Water Affairs and Forestry proceeded during the year. Detailed working arrangements were established in respect of the Eskom, Koeberg and NECSA Pelindaba sites, and significant progress was achieved in establishing similar arrangements in all the provinces.

Although no formal working arrangements have been established between the NNR and the Directorate: Mine Rehabilitation of the Department of Minerals and Energy, the NNR played an active role in the various structures established to co-ordinate matters related to mine environmental management.

Visit to SA by IAEA chief

The Director-General of the International Atomic Energy Agency (IAEA), Dr Mohammed El-Baradei, visited South Africa in April.

A major reason for his visit was to address the SA Institute of International Affairs (Witwatersrand Branch) on "Nuclear Non-Proliferation and Disarmament: The role of various countries with special emphasis on developing countries". He also gave the Royal Society of SA an overview of the status of nuclear power generation.

During his visit, Dr El-Baradei met a range of governmental leaders and visited nuclear organisations including the NNR, Eskom's PBMR project, the SA Nuclear Energy Corporation at Pelindaba, Koeberg nuclear power station and the National Accelerator Centre.



The Director-General of the International Atomic Energy Agency (IAEA), Dr Mohammed El-Baradei (seated centre).

HUMAN RESOURCES



De Waal Weideman
Manager: Human Resources

The staff complement of the NNR was 81 at the end of the reporting period. The NNR appointed eight new members of staff during the year in the following discipline areas:

- Mechanical engineering (compliance QA)
- Design engineering
- Metallurgist (fuel manufacturing)
- Accident analysis
- Radiation protection
- Waste management
- Physics
- Legal

Six members of staff listed above were employed in anticipation of the regulatory work envisaged on the possible licensing of the PBMR project.

The employment of staff for this project, however, forms part of the NNR human resource, and succession plan policies and staff employed to work on the PBMR project will therefore be redeployed should the PBMR project not come to fruition.

Two members of staff retired during the reporting period and seven resigned. The positions of General Manager and Deputy General Manager were vacated as a result of retirement and resignation respectively.

The NNR embarked upon a restructuring exercise at the end of the reporting period. It is envisaged that this process will be finalised during the forthcoming financial year.

Employment equity

The NNR developed its Employment Equity Plan through a consultative process with staff, and submitted its plan to the Department of Labour. This process included the identification and amendment of NNR policy documents, which did not comply with Employment Equity legislation or principles.

Good progress was made with the implementation of the NNR's affirmative action policy and it exceeded its targets set for 2000/2001. The representation figures are detailed in the Directors' report.

Staff development

The NNR continued with the implementation of its staff training and development plan. The implementation of the plan fulfils all the requirements of the Employment Equity Act and the NNR's affirmative action policy. Priorities were determined with specific emphasis on accelerated training for staff from the designated group.

One member of staff attended a nuclear engineering course presented by Eskom at Koeberg, whilst six members attended the post-graduate course in nuclear safety at the Wits University. In addition to this training, the training programme covered scientific and technical training together with soft skills training and management training where necessary.

Information technology

The NNR decided to move from the Lotus Notes operating environment to a Microsoft-based operating environment, and implemented the Zylab data storage and retrieval system.

The implementation of the new system started towards the end of the reporting period and it is envisaged that it will be fully implemented by the middle of the forthcoming financial year.

The NNR decided to move from Windows 95 to Windows 2000 after thoroughly testing the Windows 2000 environment. The implementation of the new system will be completed during the forthcoming financial year.

Finance

The NNR implemented a new computerised accounting system during the financial year. Problems were experienced with the implementation of the new system. This had, however, been resolved in time for the audit by the Auditor-General.

The NNR received an unqualified audit report from the Auditor-General. Details of the NNR's financial position are contained in the financial statements and Directors' report.

NATURE OF BUSINESS

The National Nuclear Regulator (NNR) was established in terms of section 3 of the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) to:

a) provide for the protection of persons, property and the environment against nuclear damage through the establishment of safety standards and regulatory practices;
b) exercise regulatory control related to safety over –
    1) the siting, design, construction, operation, manufacture of component parts and the decontamination, decommissioning and closure of nuclear installations; and
    2) vessels propelled by nuclear power or having radioactive material on board which is capable of causing nuclear damage, through the granting of nuclear authorisations;
c) exercise regulatory control over other actions, to which the Act applies, through the granting of nuclear authorisations;
d) provide assurance of compliance with the conditions of nuclear installations through the implementation of a system of compliance inspections;
e) fulfil national obligations in respect of international legal instruments concerning nuclear safety and ensure that provisions for nuclear emergency planning are in place.

STATE OF AFFAIRS

The NNR's strategy is to implement responsible and effective regulatory control. It accomplishes this by developing and implementing regulatory standards and practices that are comparable internationally. Quantitative and qualitative assessment techniques and safety assurance programmes are applied in an efficient and cost effective manner.

The activities of the NNR are carried out within the mandate provided to it by the NNR Act, and in line with broad government policy. In this regard, the NNR has worked closely with a number of government departments, giving effect to the principles of co-operative governance and intergovernmental relations as contemplated in the Act.

In discharging its mandate the NNR continues to implement government policy regarding transformation. In this regard, the NNR has developed and implemented an Employment Equity Plan, including a staff development plan. During the year under review, the NNR remained committed to capacity building initiatives, ensuring that people from the previously disadvantaged communities are given an opportunity to enter the nuclear industry.

Public participation in the regulatory process received a much higher priority than was the case previously and it is envisaged that more initiatives will be undertaken in the future to ensure that the public is kept informed on regulatory and safety related matters, and that they are involved in the regulatory processes.

By conducting safety assessments, monitoring compliance with conditions of licence and authorisations, and inspecting activities on a regular basis, the NNR has been able to ensure the introduction of appropriate measures to maintain safety margins and to provide assurance of nuclear safety nationwide.

The NNR strove during the reporting period to improve its financial management controls. However, as a result of problems experienced with the implementation of a new financial accounting system, it was unable to fully achieve this objective. The implementation problems resulted in management reports not being issued on a regular basis. Measures have been implemented to rectify these problems and regular reports will be provided to management and the Board during the new financial year.

It became evident during the year that the NNR's income would no longer be adequate to sustain the increasing demands in respect of succession planning and skills transfer, capacity building initiatives, co-operative governance and public participation initiatives. However, the NNR considered it as critically important that these initiatives be maintained, and allocated financial resources towards their continued implementation.

Measures are being implemented to ensure that the NNR is adequately resourced in future to ensure that it can maintain and give further impetus to its transformation initiatives.

Going Concern

The NNR is required to make provision for a liability which it has in respect of post-retirement medical benefits for certain categories of staff. In order to comply with the provisions of AC 116, the provision has to be made in a prescribed way, and this has resulted in a situation in which liabilities technically exceed assets.

The liability resulted from a decision by the Board of the erstwhile Council for Nuclear Safety to provide medical aid benefits to members of staff who were in the employ of the NNR on or before 31 December 1995, and who retire from the services of the NNR. The NNR applied to the Minister of Finance to establish a fund for the purpose of pre-funding this liability. However, this request was denied and the NNR was instructed to meet this liability on a "pay as you go" basis by providing for the expenditure annually.

The Directors have, however, no reason to believe that the organisation will not be a going concern in the year ahead.

OPERATING RESULTS AND FINANCIAL POSITION

Summary of Income

The NNR derives its income from the following sources:

Government grant	R 7 230 000	(18.5% of income)
Interest on funds in bank	R 858 036	(2.2% of income)
Licence and authorisation fees:		
Koeberg project	R 17 146 224	(43.9% of income)
PBMR project	R 4 467 696	(11.5% of income)
NECSA project	R 3 717 209	(9.6% of income)
Mining and minerals processing project	R 4 165 821	(10.6% of income)
Other income	R 1 469 026	(3.7% of income)

Summary of Expenditure per main group

Power Reactor Group	R 14 164 141	(30.8%)
Mining, Waste and Nuclear Technology Group	R 5 933 336	(12.9%)
Human Resources and Support Services	R 14 414 384	(31.4%)
Staff Functions and Top Management	R 6 088 957	(13.2%)
Board	R 303 336	(0.7%)
Net provisions	R 5 059 135	(11.0%)

The above figures represent real expenditure per main group. It should be noted that most of the overhead costs, such as building rent, repairs and maintenance, telecommunications etc, have been paid for from the Human Resources and Support Services budget since the expenditure was not allocated proportionally to the other departments.

Summary of expenditure per budget category

Personnel expenses incl. provisions	R 31 014 134	(67.4%)
Subsistence and Transport expenses	R 2 674 846	(5.8%)
General expenses	R 5 486 898	(11.9%)
Running expenses	R 4 520 596	(9.9%)
Sundry expenses	R 1 231 940	(2.7%)
Capital expenses	R 1 034 875	(2.3%)

Actual income and expenditure versus budget

INCOME

Description	Actual income Period ended 31/03/2001 R	Total budget Period ended 31/03/2001 R	Variance (over) / under Are	%
Licence fees	29,496,951	31,694,000	2,197,049	6.9
Other projects	1,347,615	-	(1,347,615)	(100.00)
State contributions	7,230,000	7,230,000	-	-
Interest received	858,036	1,095,000	236,964	21.6
Sundries	26,407	-	(26,407)	(100.0)
TOTAL	**38,959,009**	**40,019,000**	**1,059,991**	**2.6**

EXPENDITURE

Description	Actual expenses Period ended 31/03/2001 R	Total budget Period ended 31/03/2001 R	Variance (over) / under Are	%
Personnel	31,014,134	28,717,000	(2,297,134)	(8.0)
S&T	2,674,846	2,279,000	(395,846)	(17.4)
General	5,486,898	3,530,000	(1,956,898)	(55.4)
Running	4,520,596	4,157,000	(363,596)	(8.7)
Sundries	1,231,940	-	(1,231,940)	(100.0)
Sub-total	**44,928,414**	**38,683,000**	**(6,245,414)**	
Assets	1,034,875	1,336,000	301,125	22.5
TOTAL	**45,963,289**	**40,019,000**	**(5,944,289)**	**(14,9)**

Explanation for over-expenditure on budget

TOTAL ACTUAL EXPENDITURE	
Less un-budgeted items	45,963,289
Personnel	
Post-retirement medical aid and benefits	- 4 514 206
Personnel Provision	
Accumulated leave	- 87 573
Accumulated bonuses	- 133 980
General Expenses	
PBMR Projects	- 1 347 615
Sundries	
Bad debts & provision for bad debts	- 66 936
Disposals and adjustment	- 113 815
Total expenditure budgeted for	**39 699 164**

STRUCTURE AND FUNCTIONS OF CORE GROUPS OF THE NNR

The NNR is comprised of four main groups, namely:

a) *Power Reactor Group*

The group has three departments, namely:

- Koeberg Nuclear Power Station Projects Department
- Pebble Bed Modular Reactor Project Department
- Reactor Assessment Department

The main function of the Power Reactor Group is to regulate the projects for which it is responsible through the issuing of nuclear licenses, carrying out of compliance inspections, etc.

b) *Mining, Waste and Nuclear Technology Group*

The group is comprised of three departments, namely:

- Mining and Minerals Processing Department
- Nuclear Technology and Waste Projects Department
- Scientific and Technical Assessment Department

The main function of the Mining, Waste and Nuclear Technology Group is to regulate the mining and minerals processing industry, South African Nuclear Energy Corporation (NECSA) and the Vaalputs waste repository, through the issuing of nuclear licenses and authorisations and the carrying out of compliance inspections etc.

c) *Human Resource and Support Services Group*

The group is comprised of three departments, namely:

- Human Resources and General Administration
- Finance and Remuneration
- Information Technology and Information Services

The main function of the group is to provide administrative support and infrastructure to the organisation.

d) *Staff Functions Group*

The group is comprised of a number of specialists in the following areas:

- Legal Services
- Public Relations and Communications
- Board Secretariat
- International Liaison

The main function of these specialists is to provide support to the Chief Executive Officer and top management.

PERSONNEL STRUCTURE OF THE NNR

Staff Category	Number
Chief Executive Officer	1
General Manager	1
Deputy General Manager	1
Senior Managers	2
Managers	6
Deputy Managers	4

Division Heads	3
Senior Specialists (scientists, engineers)	24
Specialists	15
Administrative and secretarial staff	17
Support staff	1

Following the retirement of the General Manager and the Deputy-General Manager, the NNR embarked on a re-structuring of the organisation. The main objective was to flatten the management structure and to delegate responsibilities to appropriate levels of staff within the organisation. The re-structuring process will be completed during the next financial year.

STAFF QUALIFICATIONS

Qualifications	Numbers of staff
Doctorate	8
Masters	11
Honours	18
Baccalaureate	13
Diploma	15
Matric	14
Sub-matric	2

EMPLOYMENT EQUITY

Representivity figures – total staff

Group	Number/percentage
White males	37 (45.5%)
Designated group	44 (54.5%)
Black	30 (37%)
Male	60 (74%)
Female	21 (26%) black = 11%)
Disabled	2 (2.4%)
Management figures	
White males	8 (53.3%)
Blacks	7 (46.7%)

PREDETERMINED OBJECTIVES

The object of the NNR was defined in the Governing Statute (Section 5 of the National Nuclear Regulator Act, 1999 (Act No.47 of 1999) and required the NNR to establish a regulatory control process over a range of activities involving nuclear energy and materials with a view to safeguarding the public, the workforce and the environment against nuclear damage.

Accomplishment of the full mandate of the NNR required that a wide range of objectives had to be identified. Some of these objectives are ongoing and progress is reported on an annual basis. Other objectives are of shorter duration and lend themselves to completion within specific timeframes.

The objectives were formulated to facilitate, to the maximum extent possible, their review against performance considerations on both a quantitative and financial basis, bearing in mind the constraints imposed by the nature of the business, which often does not lend itself to ready quantification and measurement.

The NNR Board approved a list of objectives at the March 2000 meeting, for implementation during the 2000/2001 financial year.

These objectives are described below. Key performance areas, which were required to meet the objectives, are indicated together with a description of the progress made.

This report covers the period 23 February 2000 to 31 March 2001, the first date being the commencement of the National Nuclear Regulator Act, 1999 (Act 47 of 1999) which came into effect on 23 February 2000.

A. CORPORATE AFFAIRS

A.1 National Policies

Objective

To provide input and advice to government in respect of national policy development for radioactive waste management, national energy policy, national disaster management and the Pebble Bed Modular Reactor project.

Key Performance Areas

- Provide input into the national radioactive waste management policy and strategy development process as requested by the Department of Minerals and Energy (DME).
- Act as an observer in the national energy policy process and advise as appropriate.
- Provide input as required into national policy in respect of safety aspects of new nuclear technologies, especially the Pebble Bed Modular Reactor (PBMR)
- Provide input into a National Disaster Management Policy and initiate a dialogue with relevant departments

Performance results

- In respect of radioactive waste management, the NNR achieved this objective and through its active participation in the DME working group assisted in the development of a national policy and strategy.
- The NNR has provided regular input to the Interdepartmental Co-ordination Committee (IDCC) on the PBMR. Under the chairmanship of the Department of Minerals and Energy, the IDCC meets on a monthly basis. This objective is ongoing.
- Under the umbrella of the Interdepartmental Disaster Management Committee (IDMC), chaired by the Department of Provincial and Local Government, the NNR chairs the "Task Team–Radiological Emergencies". To date National Draft Guidelines for Radiological and Nuclear Emergencies have been prepared by the Task Team, for presentation to the Disaster Management Forum. This objective is ongoing.

A.2 Legislation

Objective

To discharge the responsibilities and obligations placed on the NNR by the provisions of the NNR Act and to provide input to assist in the promulgation of any necessary amendments.

Key Performance Areas

- Propose the prescribed format for application for a nuclear authorisation.
- Consult with the Minister with regard to regulations on co-operative governance.
- Recommend to the Minister of Minerals and Energy an amount for authorisation fees.
- Recommend the amount of financial security and the manner for providing such security.

Performance results

- The prescribed format for the Application for a Nuclear Authorisation was proposed to and subsequently authorised by the Minister of Minerals and Energy.
- Regulations on co-operative governance were prepared but the consultation with the Minister has not yet taken place.
- The Executive prepared a proposal to the Board on the authorisation fees. Progress was made on the difficult issue related to transition from a variable to a fixed fee for mining and minerals processing facilities. An accounting firm was commissioned to conduct a study on the fees attributable to each authorisation project. This information will serve as further input into the recommendation to be made to the Minister.
- The Executive prepared a proposal on the amount of financial security and the manner in which this could be provided. The Board approved this proposal in principle but further consultation with holders of nuclear authorisations and other stakeholders will be necessary before a recommendation is made to the Minister.

A.3 National Nuclear Regulator Affairs

Objective

To establish a structured programme of work for the Board, implement a capacity building programme for Board members and provide the necessary administrative support to the Board.

Key performance areas

- To assist the newly created Board in understanding the work and functions of the NNR.
- To provide the directors with information relevant to their work, in order for them to make informed decisions.
- To provide information to the directors to enable them to manage their responsibilities.

Performance results

- Three meetings were held during the first two months in order for the directors to be informed on topical issues.
- Two special sessions were held to fully appraise the directors on matters which would require their immediate attention.
- A presentation was given to the directors on the Public Finance Management Act, in order for them to fully understand their responsibilities and liabilities under the PFMA, as well as under the NNRA.
- An information document was compiled on the PFMA and NNRA for reference purposes.
- A workshop was held to discuss regulations for Standards.
- A workshop was held to discuss and develop the NNR mission and strategy, strategic goals for 2002/2003 and the organisational structure.

A.4 Management Affairs

Objective

To apply a structured management programme and to monitor compliance with the requirements of the Public Finance Management Act (PFMA).

Key Performance Areas

- Review the management programme.
- Ensure management and directors are aware of the requirements of the Act.

Performance results

- An EXCO consisting of the Chief Executive Officer and senior managers and a MANCO consisting of the Executive Committee and all managers were established. These two committees met on alternating weeks to discuss progress on objectives and to ensure co-ordination.
- Management, finance staff and directors were provided with training on the requirements of the Act, and were provided with an information document detailing the requirements and responsibilities contained in the respective Acts.

A.5 Supporting Activities

Objective

Establish and implement co-operative governance agreements with the DWAF, DEAT and DME.

Key Performance Areas

- Implement a co-operative agreement with the DWAF.
- Establish and implement a co-operative agreement with the DEAT.
- Establish and implement a co-operative agreement with the DME.

Performance results

- As part of further efforts to implement the existing co-operative agreements, the NNR established detailed working procedures regarding Koeberg Nuclear Power Station (KNPS) and the Pelindaba facilities of the South African Nuclear Energy Corporation (NECSA). In respect of mining and minerals processing, which covers most of the DWAF regions, two workshops were held between the NNR and DWAF regional officers. A generic working procedure was agreed, which still has to be approved by all the DWAF regional directors.
- Although no formal co-operative agreement is in place with the DEAT, the NNR has established links with the DEAT and held several meetings mainly pertaining to the Environmental Impact Assessment and the licensing of the proposed Pebble Bed Modular Reactor (PBMR)
- The establishment of a de jure co-operative agreement with the DME awaits the finalisation of Regulations in this regard. However, the NNR maintained its active participation in all the structures of the DME: Minerals Development section. In preparation for the development of a co-operative agreement, a meeting was held with the DME: Mine Health and Safety Inspectorate.

Objective

To maintain liaison with public interest groups and implement programmes of education in the work and functions of the NNR through publications, workshops and meetings.

Key Performance Areas

- Maintain liaison with public interest groups at and around the NECSA.
- Establish a programme of workshops with mine employee representatives in all regions.
- Maintain liaison with public interest groups at and around the Koeberg Nuclear Power Station (KNPS).

Performance results

- The NNR attended all meetings of the NECSA Pelindaba Communication Forum.
- A programme of workshops with mine employee representatives has been prepared.
- The NNR hosted the following meetings at and around the KNPS:
  - Two meetings with all the unions represented at the KNPS.
  - Six meetings with the Koeberg Environment Development Committee (KEDC)
  - Three meetings with the Emergency Planning Liaison Committee (EPLC).

Objective

Maintain appropriate involvement and liaison with relevant international organisations and overseas nuclear regulatory authorities.

Key Performance Areas

- Attend the 4-yearly congress of the International Radiation Protection Association (IRPA).
- Participate in the Waste Safety Standards Committee (WASSC) and the Transport Safety Standards Committee (TRANSSAC) of the International Atomic Energy Agency (IAEA).

- Attend the meeting of the Network of Regulators with Small Nuclear Programmes (NERS).
- Arrange visits for the Director of the UK Nuclear Safety Directorate (NSD) to discuss general regulatory matters and for the delegation of the Vice-Governor of the Guangdong Province, China, to discuss matters related to disaster management around the Koeberg Nuclear Power Station.

Performance results

- Three representatives of the NNR attended the IRPA congress and one member was elected Vice-President of the Association.
- The NNR participated actively in three meetings of the WASSC and the TRANSSAC of the IAEA.
- The NNR attended the NERS meeting in Finland.
- The NNR hosted the inaugural meeting of the Framatome Regulator's Group (FRAREG) in South Africa. National Regulators from France, Belgium, South Korea, China (unable to attend) and South Africa constitute this group.
- The NNR arranged visits for the Director of the UK NSD and the delegation of the Vice-Governor of the Guangdong Province, China.

Objective

Fulfil the national obligations in respect of the Convention on Nuclear Safety and pursue progress with signature and ratification of the Conventions dealing with liability and radioactive waste safety.

Key Performance Areas

- Fulfil the national obligations in respect of the Convention on Nuclear Safety.
- Pursue progress with the signature and ratification of the Conventions dealing with radioactive waste safety.

Performance results

- The NNR has implemented a project plan to prepare the second South African National Report, which will be presented at the Convention for Nuclear Safety Meeting to be held in Austria during April 2002. The report must be submitted to the IAEA, through the official channels, by 15 October 2001.

Objective

To provide input and assistance for the national capacity development programmes in nuclear, radiation and radioactive waste safety.

Key performance areas

- Identify the areas in which the NNR has to provide input and identify the human and financial resources that will be required.
- Develop a plan to make human resources available for developing and presenting lectures.
- Co-ordinate the NNR inputs with the steering committees of the respective courses.
- Develop a plan to ensure that the NNR may sustain its inputs into its capacity building initiatives, particularly with regard to financial resources.

Performance results

- Steering committees have been formed to co-ordinate the input and resources required from the various organisations. Management reviewed the requirements and made resources available with due consideration to the limitations in terms of the availability of resources. A special request for an increase in the income received from the State to cater for capacity building initiatives was submitted to the Department of Minerals and Energy.

Objective

To maintain the necessary supporting technical and radio-analytical service capabilities required by the NNR.

Key Performance Areas

- Develop two new procedures in the radio-analytical laboratory to strengthen the independence of the NNR in this respect.
- Analyse all samples related to the KNPS and the NECSA Environmental Verification Programmes.

Performance results

- The procedures were developed as planned.
- All samples from the verification programmes were analysed, together with samples analysed for investigative purposes. In all, 192 samples were analysed during the year.

B. SAFETY STANDARDS

Objective

Maintain a programme of development and review of standards in respect of nuclear, radiation and radioactive waste safety practice.

Key Performance Areas

- Recommend regulations on safety standards and regulatory practice to the Minister of Minerals and Energy.

Performance results

- The NNR Executive prepared draft regulations on safety standards and regulatory practice for consideration by the Board. Due to the number and complexity of the issues, a workshop was arranged at which representatives of the Executive, Board and a number of stakeholders were present. The Board subsequently gave approval for the draft regulations to be recommended to the Minister of Minerals and Energy.

C. LICENSING PROJECTS

C.1 KOEBERG NUCLEAR POWER STATION (KNPS)

Objective

To maintain a current and valid safety assessment, ensure that appropriate conditions of licence are in place and to implement an effective compliance assurance programme.

Key Performance Areas

- Review licence change requests.
- Review proposals for modifications.
- Review conditions of authorisation.
- Regulate occupational exposure.
- Regulate public exposure.
- Achieve an improvement in safety indicators.
- Conduct inspections and audits to assure compliance with all conditions of authorisation.

Performance results

- The NNR reviewed 32 licence change requests and 48 modification requests, of which 12 were related to major modifications, to maintain a current and valid safety assessment.
- The conditions of authorisation for the KNPS Licence are being reviewed. This is an ongoing activity that will continue into the next financial year.
- The exposure of workers at Koeberg remained comparable with the best international practice. The average exposure of workers was 0.45 mSv and the maximum was 9.44 mSv, which is well below the annual limit of 50 mSv.
- The exposure of the affected public was 0.000527 mSv compared to the dose limit of 0.25 mSV. The environmental verification programme undertaken by the NNR did not indicate any contamination of the environment.
- The NNR has developed and implemented a regulatory safety indicator system to independently monitor the safety performance of the KNPS.
- To assure compliance with the conditions of authorisation, 1460 inspections and 8 audits were conducted.

Objective

To ensure effective implementation of the action plan arising from the Koeberg Safety Review (KSR) and actions arising from the revision of the emergency planning basis.

Key Performance Areas

- To develop and monitor the implementation plan of identified corrective actions for safety improvements arising fromthe KSR Project.
- To finalise the assessment of the technical basis of the KNPS emergency preparedness arrangements in order to resolve the issues of demographics and to monitor controls on development around the KNPS.

Performance Results

- All the actions, including both Eskom and NNR recommendations, arising from the KSR Project have been collated in a master project plan. Implementation of these actions is being monitored at the monthly Koeberg Licensing Liaison Committee (KLLC) meeting.
- The NNR finalised its assessment of the technical bases of the KNPS emergency preparedness arrangements and presented its report to the NNR Board, which plans to hold discussions with the relevant stakeholders to resolve demographic and development issues around KNPS.

C.2 PEBBLE BED MODULAR REACTOR (PBMR)

Objective

To ensure the establishment of an appropriate design basis for the PBMR and the structuring of a comprehensive safety case by Eskom.

Key Performance Areas

- To evaluate and finalise acceptance of the Eskom licensing philosophy for the PBMR.
- To evaluate and finalise acceptance of the Eskom safety case for the PBMR.
- To ensure fulfilment of all quality assurance requirements for activities having a bearing on nuclear safety.

Performance Results

- After a number of meetings, workshops and discussions between Eskom and NNR, the framework of the safety analysis report for the PBMR was finalised and was acceptable to the NNR.
- One component of this framework is the PBMR safety case philosophy. NNR review of the safety case, as submitted by Eskom, was completed and comments sent to Eskom. Further interactions are necessary in order to finalise and approve the safety case.
- The NNR issued a Licence Document stipulating the Quality Assurance requirements for the PBMR and carried out four audits and surveillances in the areas of documentation control, SAR and safety case development, design control and quality management of the ASTRA facility in Russia.

Objective

To review the Safety Analysis Report as it evolves.

Key Performance Areas

- Review the Safety Analysis Report (SAR) for the PBMR and document the NNR bases for its acceptance (or otherwise) in a NNR Safety Assessment Report.

Performance Results

- A preliminary SAR Rev.O was submitted to the NNR for information. The NNR reviewed this SAR and documented its findings.
- The SAR in support of the nuclear installation license application (SAR Rev1) will be submitted to the NNR in August 2001. A plan for the review of this report has been formulated by the NNR.

Objective

To provide necessary input and to participate as necessary in the public consultation processes required for the EIA required under the NNR Act.

Key Performance Areas

- To interact with DEAT, DME, Eskom and their consultants to establish a joint public participation process for the EIA and the licensing processes.
- To participate as necessary in the joint public participation process driven by the EIA.
- To implement the specific requirements of the NNR Act with regard to public participation in the PBMR licensing process.

Performance Results

- A Joint Review Committee (JRC) comprising the NNR, DEAT, DME, Eskom and Eskom's consultant, POLTEC, was formed to plan and implement the EIA public participation process. DEAT and the NNR agreed that it was appropriate to have a joint public participation process that would meet the requirements of both the EIA and the licensing process.
- The NNR participated in all the public meetings, information and capacity building workshops held in terms of the joint EIA and licensing public consultation process.
- On receipt of the licence applications from Eskom and NECSA for the PBMR plant and the PBMR fuel manufacture plant respectively, the NNR implemented the requirements of the NNR Act, sections 21(3) and (4), relating to public participation in the NNR authorisation process. This action is still ongoing.

C.3 Radioactive Waste Management

Objective

Review the adequacy of waste acceptance criteria for all radioactive waste storage and disposal facilities.

Key Performance Areas

- Obtain the criteria for the Vaalputs Radioactive Waste Repository from NECSA and complete the assessment.
- Assess waste acceptance criteria for long-term storage at NECSA

Performance results

- The NNR assessed the waste acceptance criteria for both the Vaalputs Radioactive Waste Repository and the long-term storage site at NECSA.

Objective

Pursue the rehabilitation of contaminated off-mine sites.

Key Performance Areas

- Agree with the mining industry an option for the management of waste material arising from the rehabilitation of contaminated off-mine sites.

Performance results

- The NNR proposed various options to the mining industry. The option that the industry preferred required a comprehensive safety analysis. The NNR finalised its requirements for such an analysis and is awaiting further proposals from the industry.

C.4 NECSA

Objective

To maintain a current and valid safety assessment for all NECSA facilities, ensure that appropriate Conditions of Licence are in place and ensure an effective compliance assurance programme.

Key Performance Areas

Review requests for amendment of the licence

- Review conditions of authorisation
- Regulate occupational exposure
- Regulate public exposure
- Achieve an improvement in safety indicators
- Conduct inspections and audits to assure compliance with all conditions of authorisation and Conditions of Licence
- Receive and evaluate routine reports

Performance results

- The NNR reviewed 152 requests for licence amendment, to ensure that the safety assessment was current and valid.
- The conditions of authorisation were reviewed and as a result one requirement was revised and one was prepared for inclusion in the licence.
- The levels of exposure of workers at NECSA to ionising radiation remained comparable with best international practice. The average exposure of workers was 0.68 mSv and the maximum was 11.7 mSv, which was less than the 14.9 mSv recorded during the previous year and also well below the annual limit allowed of 50 mSv.
- In terms of public exposure, major concerns about the effluent management system were identified in response to an NNR query on a NECSA routine report in the previous reporting period. The NNR undertook a major investigation into the matter and required NECSA to conduct its own investigation and implement appropriate corrective actions. The safety margins in the NNR regulatory system prevented any overexposures resulting from shortcomings in the system. The exposure to the affected public was 0.1 mSv, compared to the dose limit of 0.25 mSv. The environmental verification programme undertaken by the NNR also did not indicate any contamination of the environment.
- As a first step in the introduction of a comprehensive safety indicator system, the number of occurrences requiring attention was monitored. The number improved from a monthly average of 10.2 to 9.1.
- Compliance with all the conditions of authorisation was assured by conducting 245 inspections and audits.
- All required routine reports were received and evaluated. No specific matters of concern related to safety were identified.

Objective

Monitor the implementation of actions arising from the proposed power upgrade to the Safari Reactor and from the review of the Safety Analysis Report.

Key Performance Areas

- Progress the evaluation of the Safari Safety Analysis Review, including the safety case related to the power upgrade of the Safari Reactor.

Performance results

- The evaluation of this major submission was progressing according to plan (due for finalisation in December 2001) and was 50 percent completed by the end of the reporting period.

Objective

To ensure effective progress on the safety assessment for the long-term storage and disposal of radioactive wastes falling within the responsibility of NECSA.

Key Performance Areas

- Evaluate the assessment criteria for the long-term storage of radioactive waste at Thabana.
- Evaluate the criteria for the post-closure assessment of the Vaalputs National Radioactive Waste Repository.
- Progress the safety case associated with the radioactive waste smelter facility.

Performance results

- The assessment criteria for Thabana were evaluated.
- The assessment criteria for the Vaalputs National Radioactive Waste Repository were evaluated.
- A licence application for the smelter facility was received and the NNR prepared guidance on the safety case that would be required.

C.5 Mining and Minerals Processing

Objective

To achieve safety compliance of all activities covered by the Act.

Key Performance Areas

- Identify industries and facilities that may be covered by the Act.
- Develop a plan to assess the radiation hazards from these industries and facilities.

Performance results

- The NNR identified the industries and facilities, based on its own experience, from investigations and from active participation in international programmes related to the radiation hazards from mining and minerals processing facilities.
- The development of the plan has not been completed since the facilities that may be covered by the Act are dependent on the regulations on safety standards and regulatory practice mentioned earlier in Section B "SAFETY STANDARDS" of this report.

Objective

To ensure the evaluation and implementation of radiation protection and radioactive waste management programmes of all licensees, concerning the exposure of employees and members of the public to ionising radiation.

Key Performance Areas

- Complete the evaluation of all radiation protection programmes concerning occupational exposure.
- Complete the evaluation of all radiation protection programmes concerning public exposure.
- Receive and complete the evaluation of all radioactive waste management programmes covering the quantification and categorisation of radioactive waste.

Performance results

- The NNR achieved this objective through evaluation of 24 radiation protection programmes concerning occupational exposure, 32 radiation protection programmes concerning public exposure and 40 radioactive waste management programmes.

Objective

To benchmark conditions of authorisation against international practice and to implement effective compliance assurance programmes.

Key Performance Areas

- Undertake a formal benchmarking.
- Regulate occupational exposure.
- Regulate public exposure.
- Conduct inspections and audits to assure compliance with all conditions of authorisation.
- Receive and evaluate routine reports.

Performance results

- The benchmarking was completed. The outcome will be integrated with an evaluation of all conditions of authorisation once the Regulations on safety standards and regulatory practice mentioned earlier in section "B. SAFETY STANDARDS" have been finalised.
- The exposure of workers has generally decreased and the average annual dose of 6.5 mSv is well below the 50-mSv annual dose limit. Workers at three mines continued to receive assessed radiation doses above the annual dose limit. One challenge has been the introduction of control measures in old mines that have not been designed to take radiation protection into account. Another is to develop sustainable measures in an underground environment that is extensive and dynamic and where the exact working locations are dependent on a fluctuating commodity price. Structures consisting of the NNR, management, labour, DME and technical specialists have been established to address these challenges.
- The evaluation of the public exposure control from mining and minerals processing operations is complicated by factors such as the extent of the operations and the fact that no pre-mining baseline assessments were conducted. It has been mentioned above that the public radiation protection programmes were evaluated in the previous year. The monitoring programmes that are part of these radiation protection programmes should provide the NNR with better information to evaluate the public exposure control.
- Approximately 300 inspections were conducted during the reporting period to ensure compliance with conditions of authorisations, and more than 95% of all scheduled routine reports were received and evaluated.

D. HUMAN RESOURCES AND SUPPORT SERVICES

D.1 Human Resources

Objective

To implement the Affirmative Action Policy at all levels of the organisation through purposeful recruitment and selection, accelerated training, progression and promotion.

Key Performance areas

- Review progress made with the implementation of the Affirmative Action Policy during the previous year, identify problem areas and address these through the revision of NNR procedures.
- Review the financial resources needed to meet the objective of providing accelerated training and development, progression and promotion and succession planning against the availability of funds in the budget.
- Review NNR procedures to ensure compliance with national legislation.

Performance results

- The NNR met its objective through the identification and correction of problems experienced in the implementation of the Affirmative Action Policy, and through ensuring that adequate resources were allocated for the implementation of staff development programmes, etc.
- A request for the provision of additional funding for succession planning during the 2001/2002 financial year was submitted to the Minister during September 2000. This request could not be accommodated by the Department for the 2001/2002 financial year. It was agreed that a proposal would be submitted under government's medium-term expenditure framework budgeting process, to seek additional funds for the 2002/2003 financial year.

Objective

Ensure that the existing human resources of the NNR are maintained at an adequate level for its mission, objectives and workload through effective recruitment and selection.

Key performance area

- Conduct a human resource requirement survey and develop a human resource plan.
- Review the availability of financial resources needed to provide the required human resources.

Performance results

- A survey was conducted throughout the NNR to identify the human resource requirements, taking into consideration future vacancies arising from retirements, as well as envisaged changes in the nuclear industry. A plan was developed to pro-actively recruit suitable numbers of personnel to enable the NNR to fulfil its mandate.

Objective

To develop the NNR's Employment Equity Plan, in collaboration with the Affirmative Action Monitoring Group and the Staff Association, and ensure compliance with all other legal obligations relating to employees.

Key Performance area

- Conduct an employment equity audit in the NNR to establish the status of Employment Equity in the NNR and to provide a status report to top management.
- Select and appoint a consultancy firm to assist management with the development of the report and plan.
- Manage the process of developing the report and plan to ensure full participation from all levels of staff, staff representative bodies, management and the Board.
- Prepare the final report for approval by the Board and subsequent submission to the Department of Manpower.

Performance results

- An audit procedure to assess the status of Employment Equity in the NNR has been developed through assessing all the staff demographical data, as well as through a review of NNR administrative procedures.
- Information was gathered through group-focus and also by means of individual interviews to ensure full participation by all levels of staff. A status report was prepared and submitted to the staff, management and the Board. Following the status report, the Employment Equity Plan was developed and approved by the Board. The approved plan was submitted to the Department of Manpower as required.

D.2 Finance and Administration

Objective

To implement the Public Finance Management (PFMA) and align procedures accordingly to ensure that the NNR complies with the Act.

Key performance areas

- Train staff of the finance section on the requirements of the PFMA.
- Provide detailed information to the Board of Directors on their responsibilities in terms of the Act.

- Align the NNR's financial and other management practices with the requirements of the PFMA.

Performance results

- All relevant staff of the NNR attended training courses on the requirements of the PFMA. The NNR's internal auditors were requested to review the NNR Act and the PFMA and to advise the NNR on the actions required to comply with the PFMA.
- A presentation was given to the Board of Directors to inform them of their duties and responsibilities under the PFMA. The presentation was supplemented by an information document.

Objective

Implement an effective system of administration and control over the finances and assets of the NNR.

Key performance areas

- Maintain an independent internal audit function by making use of an external auditing firm for internal audits.
- Provide management instructions to the internal auditors to provide, over and above their mandatory audit, additional specialised information to management, and to investigate specific issues on behalf of management and the Board.
- Conduct an actuarial investigation to determine the liabilities of the NNR with regard to the provision of medical aid benefits to certain categories of staff after retirement.
- Improve the system of control and management over the assets of the NNR.
- Finalise the implementation of the NNR's new computerised accounting system and verify this through internal audit.
- Improve the NNR's debtor control system to optimise the recovery of licence and authorisation fees.

Performance results

- Two audits were conducted by the internal auditors in terms of the audit plan approved by the Board's Audit Committee. These audits were supplemented by special audits, one on the NNR's leave administration system, subsistence and travel procedures and two audits on the NNR's asset control system.
- An actuarial calculation was done to establish the liability of the NNR in respect of the continuation of medical benefits for certain categories of staff after retirement. The report was submitted to the Audit Committee for consideration. The Executive will now progress the matter.
- A number of accounting procedures were amended following the special audits done by the internal auditors. This included inter alia procedures of the NNR's asset control system and the debtors control system. Significant improvements resulted from the amendment of these procedures.
- The new financial accounting system had not been fully implemented by the end of the reporting period, resulting in financial reports not being issued to management and the Board on a regular basis. This has impeded the ability of management to exercise effective control over NNR financial resources and assets. However, the systems were brought up to date in time for the Auditor-General to conduct his annual audit during June 2001. Measures have been taken to ensure that the system is fully implemented and that monthly reports are issued to management and the Board.

GOVERNANCE

The Directors approved the financial statements, which fairly represented the state of affairs of the organisation as at the end of the reporting period.

The independent internal auditor reported on the financial controls of the organisation, as well as on the financial statements.

Adequate and appropriate accounting records and a generally effective system of internal control have been maintained.

Appropriate accounting policies, supported by reasonable and prudent judgment and estimates have been applied on a consistent basis.

Applicable accounting standards have been adhered to. Departures from these standards in the interest of fair presentation have been disclosed, explained and quantified.

The Directors have, notwithstanding the contingent liability with regard to medical aid benefits for certain members of staff who will retire from the NNR, no reason to believe that the organisation will not be a going concern in the year ahead.

Internal Auditing

The Internal Auditors, KPMG, conducted two scheduled audits during the year to coincide with the drafting of the Interim Financial Statements in September, and with the year-end closing in March. In addition to the above, management instructed them to conduct special investigations into the following areas:

Subsistence and Travel procedures
The new leave administration system
The NNR's asset management system (two investigations were conducted).

The reports on these investigations and audits were submitted to the Chief Executive Officer and to the Audit Committee.

BOARD MEMBERS

The names of the directors holding office during the reporting period are as follows:

Chairperson

Dr M W Makgoba, President: Medical Research Council

Vice-Chairperson

Ms NJ Mxakato-Diseko, Chairperson: Board on Tariffs and Trade

Directors

Prof K Bharuth-Ram, Head: Physics Department, University of Durban-Westville

Ms E K Mohammed, Laboratory Manager, Johannesburg College of Education

Prof S H Taole, Dean: Faculty of Science and Technology, University of North-West

Mr L D S Thobejane, Superintendent-General: Department of Health and Welfare (Northern Province)

Mr B C Winkler, Retired (as Executive Officer of Council for Nuclear Safety)

Dr S W P de Waal, Director: Nuclear Energy, Department of Minerals and Energy (representing the Department of Minerals and Energy)

Ms M Dube, Director: Atmospheric Protection and Chemicals Management, Department of Environmental Affairs and Tourism (representing the Department of Environmental Affairs and Tourism)

Mr D Elbrecht, Treasurer-General: National Union of Mineworkers (representing Organised Labour)

Mr R Lockwood, Retired, Treasurer: Table View Residents Association (representing communities which may be affected by nuclear activities)

Mr E B Mathebula, Director: Atmospheric Protection and Chemicals Management, Department of Environmental Affairs and Tourism (representing the Department of Environmental Affairs and Tourism)

Dr J M Stewart, Mining Consultant: Chamber of Mines (representing Organised Business).

The Board of Directors was appointed in February 2001 and assumed duty with immediate effect. Ms Dube resigned from the Department of Environmental Affairs and Tourism in September 2000 and was replaced by Mr Mathebula.

Mr Elbrecht assumed duty in November 2000.

The Board met eight times during the reporting period.

BOARD SUBCOMMITTEES

The Board appointed three standing subcommittees to deal with specific issues.

Audit Committee

The main objective of the Audit Committee is to ensure that proper financial management controls are implemented and maintained by the NNR Executive, to give guidance to the Executive on financial matters and to report to the Board on such matters. The members are as follows:

Chairperson

Dr J M Stewart

Members

Ms M Dube

Mr J Bone (statutory member)

Mr E B Mathebula

Mr Mathebula replaced Ms Dube when she resigned from the Department of Environmental Affairs and Tourism.

The Audit Committee met four times during the reporting period.

Transformation Committee

The main objective of the Transformation Committee is to develop a transformation policy for the NNR and to oversee the implementation thereof.

The members are as follows:

Chairperson

Prof S H Taole

Members

Ms E K Mohammed

Mr L D S Thobejane

Mr Thobejane assumed the position of Chairperson in March 2001 as part of a system in which the Chairperson is rotated after 12 months.

The Committee held six formal meetings during the reporting period and made two presentations to staff on transformation issues.

Human Resources, Development and Remuneration Committee

The main objective of the Committee is to review the NNR's human resource practices and to provide the NNR Executive with guidance on human resource issues. The members are as follows:

Chairperson

Mr R Lockwood

Members

Dr S W P de Waal

Mr B C Winkler

The Committee met six times during the reporting period.

AUDITOR-GENERAL

REPORT OF THE AUDITOR-GENERAL ON THE FINANCIAL STATEMENTS OF THE NATIONAL NUCLEAR REGULATOR FOR THE YEAR ENDED 31 MARCH 2001

1. AUDIT ASSIGNMENT

The financial statements as set out on page 55 to 64, for the year ended 31 March 2001, and the performance information contained on pages 38 to 39 of the directors' report, 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 17(8) of the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999). These financial statements, the maintenance of effective control measures and compliance with relevant laws and regulations are the responsibility of the accounting authority. 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 auditing standards. These standards require the audit to be planned and performed to obtain reasonable assurance that the financial statements are free of material misstatement. 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 my 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 UNQUALIFIED AUDIT OPINION

2.2.1 Financial audit

In my opinion, the financial statements fairly present, in all material respects, the financial position of the National Nuclear Regulator at 31 March 2001 and the results of its operations and cash flows for the year then ended in accordance with generally accepted accounting practice and in the manner required by the Public Finance Management Act, 1999 (Act No. 1 of 1999) (PFMA).

In my opinion, the performance information furnished in terms of section 55(2)(a) of the PFMA fairly presents, in all material respects, the performance of the National Nuclear Regulator for the year ended 31 March 2001 against predetermined objectives and on a basis consistent with that of the preceding year.

2.2.2 Compliance audit

Based on the audit work performed, 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. EMPHASIS OF MATTER

Without qualifying the audit opinion expressed above, attention is drawn to the following matters:

3.1 LATE SUBMISSION OF FINANCIAL STATEMENTS

Section 55(1)(c)(i) of the PFMA requires financial statements to be submitted to the Auditor-General within two months (by 31 May) after the end of the financial year. The unapproved financial statements were submitted for audit purposes on 15 June 2001 and the approved financial statements on 28 August 2001, which is technically non-compliance with the requirements of the PFMA.

3.2 OVEREXPENDITURE ON BUDGET

As indicated and explained in the annual report, the National Nuclear Regulator exceeded the approved expenditure budget by R5 944 289. Section 53(4) of the PFMA requires the accounting authority to ensure that the expenditure of the public entity is in accordance with the approved budget.

3.3 GOING CONCERN

As indicated in note 9 to the financial statements, a provision of R4 938 679 was made for post-retirement medical benefits in order to comply with accounting statements AC 116. As a result of the provision, the liabilities exceed the assets by R2 515 739 and cause the National Nuclear Regulator to be technically insolvent.

3.4 PUBLISHED ANNUAL REPORT FOR 1999-00

The Report of the Auditor-General and audited annual financial statements of the Council for Nuclear Safety (Council) for the period ended 23 February 2000 which was included in the Council's annual report to Parliament in terms of section 6(6)a of the Public Entities Act, 1992 (Act No. 93 of 1992), was tabled by the Minister on 9 May 2001. The annual report as published by the Council contained significant errors, which was not made available to my Office for review, before tabling in Parliament. My report, [RP21/2001] dealt with in terms of section 4(4) of the Auditor-General Act, 1995 (Act No. 12 of 1995) replaces the annual report of 1999-00 published by the Council.

Detailed below are the sections of the annual report that were replaced:

- Directors report page 39 to 47;
- Report of the Auditor-General page 48 to 49; and
- Financial statements page 50 to 60.

The National Nuclear Regulator undertook to send a letter to all organisations on its annual report distribution list, informing them that the annual report contained certain printing errors and that they would be provided with amended versions of the relevant portions of the annual report.

4. APPRECIATION

The assistance rendered by the staff of the National Nuclear Regulator during the audit is sincerely appreciated.



J S Bosch

for AUDITOR-GENERAL

Pretoria

04/09/2001

FINANCIAL STATEMENTS

BALANCE SHEET AS AT 31-03-2001

	Notes	2000-2001 Period ended 31-03-2001 R	1999-2000 Period ended 23-02-2000 R
Assets			
Property, plant and equipment	3	**2,105,636**	2,269,892
Current assets		**13,119,816**	15,996,332
Accounts receivable	4	**5,691,276**	6,384,556
Payments made in advance		**47,728**	658,957
Deposits and immediately claimable amounts		**2,000**	2,000
Bank balance and cash		**7,378,812**	8,950,819
		15,225,452	18,266,224
Equity and liabilities			
Income funds		**(2,515,739)**	3,453,666
Other liabilities			
Post retirement medical benefits	5	**14,253,206**	9,739,000
Current liabilities		**3,487,985**	5,073,558
Accounts payable		**1,762,312**	3,435,458
Provision for accumulated leave		**1,725,673**	1,638,100
		15,225,452	18,266,224

EKMohamed

CENTURION 28-08-2001

Mrs Mohammed

INCOME STATEMENT FOR THE PERIOD ENDED 31-03-2001

	Notes	2000-2001 Period ended 31-03-2001 R	1999-2000 Period ended 23-02-2000 R
Income received		**38,959,009**	33,610,357
State contribution		**7,230,000**	5,620,000
Licensing fees		**29,496,951**	23,123,421
Other projects		**1,347,615**	3,869,509
Interest		**858,036**	967,304
Sundries		**26,407**	30,123
Expenditure		**44,928,414**	33,718,119
Personnel expenses	**6.1**	**31,014,134**	21,322,572
Subsistence & transport expenses	**6.2**	**2,674,846**	2,118,320
General expenses	**6.3**	**5,486,898**	6,004,591
Running expenses	**6.4**	**4,520,596**	3,288,327
Sundries	**6.5**	**1,231,940**	984,309
Operating deficit		**(5,969,405)**	(107,762)

STATEMENT OF CHANGES IN EQUITY FOR THE PERIOD ENDED 31-03-2001

	Income funds
Balance at 31-03-1999	13,300,428
Deficit for the period	(107,762)
Transferred to post retirement medical benefit provision	(9,739,000)
Balance at 23-02-2000	**3,453,666**
Deficit for the period	(5,969,405)
Balance at 31-03-2001	**(2,515,739)**

CASH FLOW STATEMENT FOR THE PERIOD ENDED 31-03-2001

	Notes	2000-2001 Period ended 31-03-2001 R	1999-2000 Period ended 23-02-2000 R
Cash flows from operating activities		**(5,085,465)**	989,200
Cash (utilised) / generated by operations	10.1	**(5,943,501)**	21,896
Interest received		**858,036**	967,304
Cash outflow from investment activities		**(1,000,748)**	(1,102,306)
Acquisition of fixed assets	10.2	**(1,034,875)**	(1,102,610)
Proceeds on disposal of obsolete assets		**95,004**	304
Deficit on adjustment on the asset register	10.3	**(60,877)**	-
Cash outflow from financing activities			
Increase in post retirement medical benefits		**4,514,206**	-
Net decrease in cash and cash equivalents		**(1,572,007)**	(113,106)
Cash and cash equivalents at beginning of the period	10.4	**8,952,819**	9,065,925
Cash and cash equivalents at end of the period	10.5	**7,380,812**	8,952,819

1 Change of name

The National Nuclear Regulator Act (Act 47 of 1999) came into effect on 24 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.

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.

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 Bursaries and training

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

2.6 Leased assets

Operating lease rentals are charged against income as incurred.

2.7 Retirement benefits

2.7.1 Retirement fund

The NNR 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 NNR 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 fund

Medical aid costs are recognised as an expense in the period during which the employees render services to the NNR. Future costs of benefits relating to certain retirements are provided for from date of retirement. The present value of future medical aid costs for such retirements is actuarially determined annually on the basis of current actuarial practice, and any shortfalls or surpluses are recognised in the income statement.

3 Property, plant and equipment

2000-2001 Period ended 31-03-2001	Furniture	Office equipment	Computer equipment	Scientific & technical equipment	Property	Total
	R	R	R	R	R	R
Carrying amount at 23-02-2000	**306,759**	**296,441**	**1,014,527**	**224,665**	**427,500 ***	**2,269,892**
At cost	548,794	702,437	5,120,670	2,241,189	427,500	9,040,590
Accumulated depreciation	(242,035)	(405,996)	(4,106,143)	(2,016,524)	-	(6,770,698)
Additions	23,260	158,316	732,874	120,425	-	1,034,875
Disposals	-	(142,354)	(7,461)	-	-	(149,815)
At cost	(8)	(185,390)	(103,113)	-	-	(288,511)
Accumulated depreciation	8	43,036	95,652	-	-	138,696
Depreciation	(52,402)	(103,932)	(832,287)	(62,568)	-	(1,051,189)
Adjustment	4,988	35,708	(8,756)	(30,067)	-	1,873
At cost	(28,386)	25,744	135,687	(22,321)	-	110,724
Accumulated depreciation	33,374	9,964	(144,443)	(7,746)	-	(108,851)
Carrying amount at 31-03-2001	282,605	244,179	898,897	252,455	427,500 *	2,105,636
At cost	543,660	701,107	5,886,118	2,339,293	427,500	9,897,678
Accumulated depreciation	(261,055)	(456,928)	(4,987,221)	(2,086,838)	-	(7,792,042)

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

* The property consist 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 Regulator on 22 April 1998. The present value is estimated at R 427,500.00.

4 Accounts receivable

	2000-20001 Period ended 31-03-2001	1999-2000 Period ended 23-02-2000
	R	R
Trade debtors	**5,540,200**	6,573,854
Less: Provision for doubtful debts	**(417,230)**	(403,600)
Net trade debtors	**5,122,970**	6,170,254
Other debtors	**568,306**	214,302
	5,691,276	6,384,556

5 Post-retirement medical benefits

	2000-20001 Period ended 31-03-2001	1999-2000 Period ended 23-02-2000
	R	R
5.1 Liablility		
Present value of the obligation (unfunded)	**17,400,000**	13,200,000
Unrecognised past service - non-vested benefits	**(3,146,794)**	(3,461,000)
Liability recognised in balance sheet	**14,253,206**	9,739,000
5.2 Movements in net liablility		
Opening net liability	**9,739,000**	-
Expense recognised in income statement	**4,938,679**	-
Amount transferred from reserves	**-**	9,739,000
Contributions paid	**(424,473)**	-
Closing net liability	**14,253,206**	9,739,000

6 Expenditure

		Notes	2000-2001 Period ended 31-03-2001 R	1999-2000 Period ended 23-02-2000 R
6.1	Personnel expenses		**31,014,134**	21,322,572
	Bursars		**402,281**	155,516
	Post retirement benefits	7.1.1	**4,938,679**	222,870
	Recruitment costs		**193,620**	82,032
	Remuneration to Directors		**127,513**	97,283
	Salaries, allowances and annual payments	7.1.2	**23,896,679**	19,705,070
	Training		**1,070,581**	416,868
	Incidental personnel expenses		**163,228**	52,063
	Provisions for:		**221,553**	590,870
	Accumulated leave (staff)		**87,573**	317,600
	Annual bonuses (staff)		**133,980**	273,270
6.2	Subsistence and travelling expenses		**2,674,846**	2,118,320
	Re-establishment costs		**94,814**	88,442
	Subsistence and travelling		**2,555,166**	2,014,327
	Incidental Subsistence & travelling expenses		**24,866**	15,551
6.3	General expenses		**5,486,898**	6,004,591
	External audit fees		**189,273**	85,810
	Provision for audit fee		**171,750**	150,000
	Under / (over) provision		**17,523**	(64,190)
	Communication services		**715,505**	527,967
	Consulting & internal audit fees		**97,174**	84,844
	Insurance		**140,968**	83,591
	Library items		**152,129**	75,646
	RSC & SDL levies		**187,875**	(122,039)
	Stationery and printing		**566,686**	203,225
	Specialised services		**2,852,887**	4,784,165
	PBMR project		**1,347,615**	3,869,509
	Other services		**1,505,272**	914,656
	Incidental general expenses		**584,401**	281,382
6.4	Running expenses		**4,520,596**	3,288,327
	Accommodation (Rent & services)		**1,604,507**	1,106,833
	Computer software		**801,122**	381,691
	Consumable stores		**338,470**	210,844
	Operating leases		**259,340**	203,248
	Research contracts		**505,187**	627,757
	Service contracts & maintenance		**967,299**	693,027
	Incidental running expenses		**44,671**	64,927
6.5	**Sundries**		**1,231,940**	984,309
	Bad debts		**53,306**	-
	Depreciation on assets		**1,051,189**	869,322
	Net loss on disposal of obsolete assets		**54,811**	887
	Adjustment on asset register		**59,004**	-
	Provision for doubtful debts		**13,630**	114,100
	Total expenditure		**44,928,414**	33,718,119

7 Expenditure

7.1 Personnel expenses:
Post retirement benefits

7.1.1 Medical aid

	2000-2001 Period ended 31-03-2001 R	1999-2000 Period ended 23-02-2000 R
Current service cost	540,000	-
Interest cost	1,320,000	-
Net actuarial (gain)loss recognised in year	2,764,000	-
Past service cost - non-vested benefits	314,679	-
Past service cost - vested benefits	-	222,870
Expense recognised in the income statement	4,938,679	222,870

The NNR 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 NNR 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 paid in respect of 20 pensioners and 42 staff members who are still in the NNR employ and will qualify for post retirement benefits when they retire.

The NNR has no liability towards members of staff who joined after 31 December 1995 and who retire from its services. The unrecognised past service cost of R 3,146,794 will be provided over the average years of the non-vested liability (10 years).

The following assumptions were made by the actuary in calculating the liability:

Interest rate per annum - discount rate	10%
Inflation rate per annum	7%
Medical inflation rate per annum - long term	10%
Medical inflation rate per annum - current year	30%
Members with which benefits have not yet vested	42
Members with vested benefits	20
Average years for non-vested liability to become vested	11

7.1.2 Retirement fund

	2000-2001 Period ended 31-03-2001 R	1999-2000 Period ended 23-02-2000 R
Working members	2,614,716	2,305,141

All employees are members of the NNR 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 NNR from the Associated Institutions Pension Fund. A full actuarial valuation of the Fund was conducted in July 2000 and it was found that the funding level was 96.0%. 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.

8 Operating leases

		2000-2001 Period ended 31-03-2001 R	1999-2000 Period ended 23-02-2000 R
	Future lease commitments		
8.1	Equipment	4,452	7127
	Vehicles	-	21,004
	Less than 12 months	4,452	28131
8.2	Equipment	260,565	410,640
	Vehicles	356,056	437,191
	More than 12 months but less than 60 months	616,621	847,831

9 Going concern

The NNR is required to make provision for a liability it has in respect of post retirement medical benefits for certain categories of staff. In order to comply with the provisions of AC 116, the provision has to be made in a prescribed way, this has resulted in a situation where the liabilities technically exceeds the assets. The liability resulted from a decision by the Board of the erstwhile Council for Nuclear Safety to provide medical aid benefits to staff who were in the employ of the NNR on or before 31 December 1995, and who retire from the services of the NNR. The NNR applied to the Minister of Finance to establish a fund for purposes of pre-funding this liability, however, this request was denied and the NNR was instructed to pay for this liability on a "pay as you go" basis by providing for the expenditure on an annual basis.

10 Notes to the cash flow statement

	2000-2001 Period ended 31-03-2001 R	1999-2000 Period ended 23-02-2000 R
10.1 Cash (utilised) / generated by operations	**(5,943,501)**	21,896
Operating deficit	**(5,969,405)**	(107,762)
Adjustment for:		
Interest received	**(858,036)**	(967,304)
Depreciation	**1,051,189**	869,322
Net loss on disposal of obsolete assets	**54,811**	887
Adjustment on asset register	**59,004**	-
Working capital changes	**(281,064)**	226,753
Decrease / (increase) in accounts receivable	**693,280**	(2,275,263)
Decrease / (increase) in payments made in advance	**611,229**	(79,741)
Increase in other Provisions	**87,573**	1,638,100
(Decrease) / increase in accounts payable	**(1,673,146)**	943,657
10.2 Acquisition of fixed assets	**(1,034,875)**	(1,102,610)
Office furniture	**(23,260)**	(46,483)
Office equipment	**(158,316)**	(274,149)
Computer equipment	**(732,874)**	(675,968)
Scientific & technical equipment	**(120,425)**	(106,010)
10.3 Adjustment on asset register	**(60,877)**	-
Loss on disposal	**(59,004)**	-
Book value of assets disposed of :	**(1,873)**	-
a) Cost	**(110,724)**	-
b) Accumulated depreciation	**108,851**	-
10.4 Cash and cash equivalents at beginning 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
10.5 Cash and cash equivalents at the end of the period	**7,380,812**	8,952,819
Bank balance and cash	**7,378,812**	8,950,819
Deposits and immediately claimable amounts	**2,000**	2,000

Schools Science Project



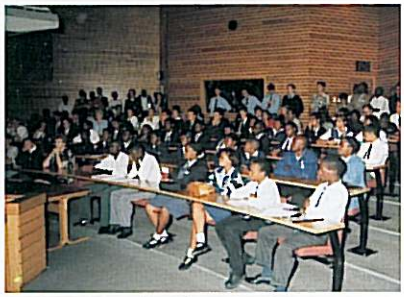
First place - Roodepoort High School



Second place - Tiger Kloof Educational



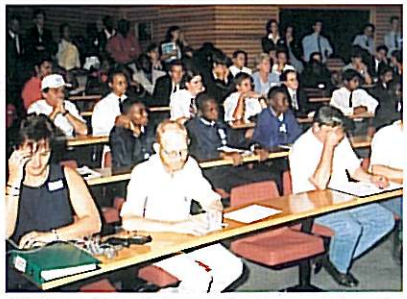
Third place - EP Mhinga High School



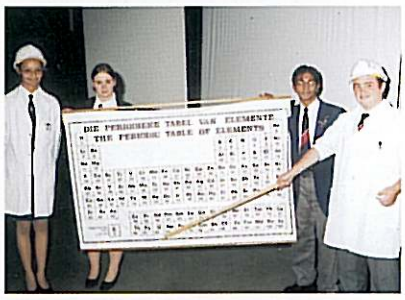
Students attending the prize giving ceremony



Olympus Educational



NNR staff and the students attending the prize giving ceremony



Brakpan High School



Pietersburg High School



Potchefstroom Secondary School



Voortrekkerhoogte High School



Ferdinand Postma High School



Sitintile High School



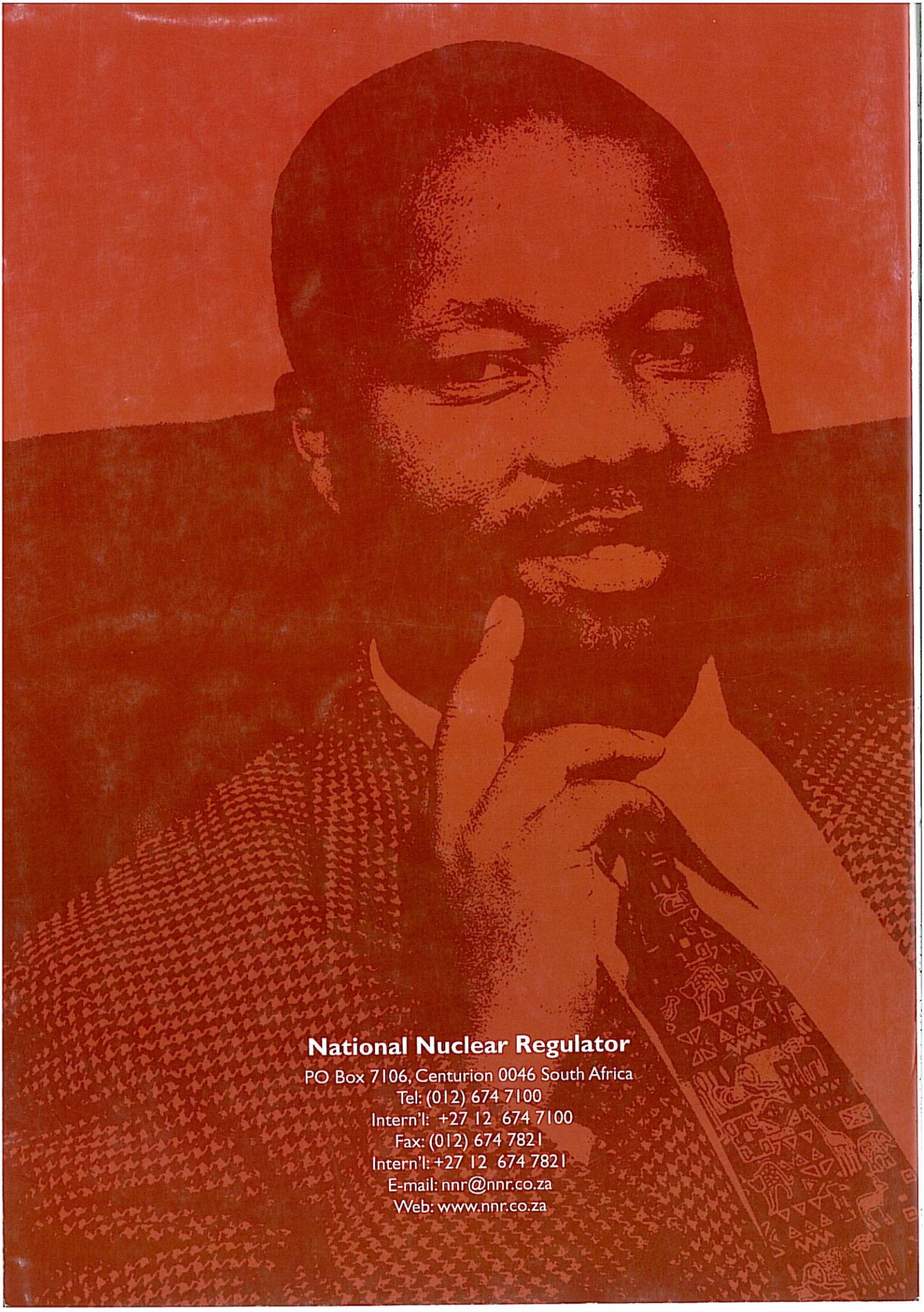
Botshabele High School



St Albans College



Silverton High School



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