

ANNUAL REPORT 2002/2003

Annual Report to the Minister of Minerals and Energy on the safety related to workers, the public and the environment associated with nuclear authorised sites in accordance with section 7(1) (j) of the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) and the financial aspects in accordance with section 55 of the Public Finance Management Act, 1999 (Act No. 1 of 1999) .

MISSION

To provide an effective national regulatory framework for the protection of persons, property and the environment against nuclear damage.

VISION:

To be recognised internationally and at home, as the leading South African Regulator in the application of regulatory and human resource management practices, including transformation, best suited to the needs of the nation.

The objectives of the National Nuclear Regulator are 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 the siting, design, construction, operation and manufacture of component parts and the decontamination, decommissioning and closure of nuclear installations and 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 National Nuclear Regulator Act applies, through the granting of nuclear authorisations;

d. Provide assurance of compliance with the conditions of nuclear authorisations through the implementation of a system of compliance inspections;

e. Fulfil national obligations in respect of international legal instruments concerning nuclear safety; and

f. Ensure that provisions for nuclear emergency planning are in place.

The Board of Directors

The regulator is controlled and governed in accordance with the NNR Act by the Board of Directors. (Refer to section: The people at the helm)

The Chief Executive Officer

The Chief Executive Officer is the accounting officer of the Board and has the responsibility to ensure that the functions of the Regulator are performed in accordance with the NNR Act and PFMA.

The Staff of the Regulator

The NNR's organisational structure is constituted of the following core groups:

a) Assessment Group
The technical assessment function previously performed by the Reactor Assessment Department and the Scientific and Technical Assessment Department have been grouped together in one Assessment Group. The Assessment Group renders technical assessment functions to all the divisions.

b) Corporate Support Services
The division has two departments, covering the following functions:
- Human Resources and Administration
- Finance, Information Technology and Information Services

c) Nuclear Technology and Natural Sources Division
The division has two departments, namely:
- Regulation of Natural Sources Programme
- Nuclear Technology and Waste Projects Programme

d) Power Reactor Division
The division has two departments, namely:
- Koeberg Nuclear Power Station Programme
- Pebble Bed Modular Reactor Programme

e) Regulatory Strategy Development Division
The division is comprised of a number of specialist services in the following areas:
- Legal services
- Communications
- Board Secretariat
- Developmental Work in Standards and Regulatory Practices.

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MR G M ABOOBAKER

Mr Aboobaker, Chief Director: Economic Sector, Policy Co-ordination and Advisory Services in the Office of the Presidency. He holds a BSc. (Mathematics and Physics) and BSc. Hons from the University of Durban-Westville and MSc (Economics of SA), SOAS, University of London. He held tutorial and lecturing posts in medical facilities in Durban and served as a physicist in Cape Town (Groote Schuur), followed by administrative and academic posts at the University of the Western Cape, in which he was engaged in numerous milestone academic and other developmental projects. He has been in the Office of the Presidency since 1995, initially as Director: Cabinet Research. He has been involved in a range of community projects over the past 30 years.



PROF K BHARUTH-RAM

Prof Bharuth-Ram is Acting Chairperson of the NNR Board, holds a doctorate in nuclear physics from the University of Oxford and is Professor of Physics at the University of Natal. He has published more than 130 contributions in international journals, authored/co-authored more than 100 contributions to international conferences and presented invited papers at four international conferences. He has received numerous scholarships and awards, and is chairman of the KwaZulu-Natal Rhodes Scholarship Selection Committee. He is has held executive positions in Natal cricket bodies and is Patron of the KwaZulu-Natal Cricket Union.



DR S W P DE WAAL

Dr de Waal, who serves on the Board as an official from the Department of Minerals and Energy, is the Director: Nuclear Safety in the Department. He is a qualified radiation biologist with 23 years' working experience in the South African nuclear industry. He is currently responsible for nuclear policy matters and the administration of legislation related to nuclear safety.



MR D ELBRECHT

Mr Elbrecht represents organised labour and is the National Treasurer and a member of the National Executive Committee of the National Union of Mineworkers. He holds an NTC 6 certificate and numerous management and leadership qualifications. He worked at Koeberg Nuclear Power Station for eight years, rising to manager of the Maintenance Centre. He was appointed non-executive chairperson of the Mineworkers Development Agency in 2002. His international exposure includes serving as a delegate to the international conferences on energy in Rio de Janeiro 2001 and Rome 2002, and vice-chair of the workers group at the ILO-Geneva 2003. He took part in official study tours in 1994 and 1999.



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. He was awarded a Certificate of Competence by the National Calibration Service. He worked for Eskom at the Koeberg Nuclear Power Station from 1991-1996.



MR E B MATHEBULA

Mr Mathebula, who serves on the board as an official from DEAT, is the Director: Chemicals and Hazardous Waste Management in the Department of Environmental Affairs and Tourism. He holds a teacher's diploma from Vista University and BSc.(Chemistry and Environmental Chemistry) from the University of Pretoria, where he is currently enrolled for his Master's degree. He has represented South Africa at international chemical-related conventions where he also played a leading role in the Africa group, and has won awards in the chemicals field.



MRS E K MOHAMED

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



MR H MOTAUNG

Mr Motaung is the Managing Director of Tsutsuma Mining and Manufacturing (Pty) Ltd and vice-president of the African Mining Association. He gained his BSc. Engineering (Mining) at the University of the Witwatersrand, followed by his MBA. He spent five years as a mining engineer with Anglo American prior to joining the Department of Minerals and Energy as a principal inspector, rising to Deputy Chief Inspector. He was involved in the implementation of the Mine Health and Safety Act throughout the mining industry, and represented the Department at numerous international conferences on mine health and safety. He has served on numerous statutory committees, including SAQA and Nedlac. He is involved in community work as a facilitator in a maths and science preparedness programme for matriculants from underprivileged communities.



PROF S TAOLE

Prof Taole is Dean of the Faculty of Agriculture, Science and Technology at the University of North West. He holds a doctorate in solid state physics from the University of Ottawa, Canada, and has contributed to numerous publications and conferences. He has been an external examiner at the Universities of the North and Fort Hare and Vista University, and has been a visiting researcher and scholar at Harvard University, Vista University and the Universities of Natal and the Witwatersrand. He has represented the University of North West at international meetings and the national commission for UNESCO. He has also worked for the National Research Foundation as a member of the core evaluation committee for physics, assessing applications for post-graduate scholarships and bilateral research applications.



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 is currently an independent consultant. He has 20 years' experience in mining-related research, including a doctoral thesis in human heat stress. He was head of the Chamber of Mines Research Organisation and thereafter spent 10 years in the Chamber as Mining Consultant, where his focus was mainly on policy issues in the areas of safety, environment, technology and the economics of the South African mining industry. His current consultancy work is concerned with sustainable development issues, mainly in relation to the mining industry.



MS L B ZONDO

Ms Zondo, the Chief Executive Officer of the NNR, educated in law, she practised as an advocate at the Johannesburg and Durban Bars. She obtained her B.Proc degree at the University of the North, her LLB at the University of Natal, Durban, and her LLM Public Law at the London School of Economics.

Prior to taking up her current position she worked as Secretary of the Preparatory Commission for the comprehensive Nuclear Test Ban Treaty Organisation, in Vienna, Austria



MR W D M FOURIE

(Alternate to Mr Mathebula)

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 environmental impact assessment and management. He worked for five years as a physics planner and for 20 years on environmental management, specifically with environmental impact legislation and regulations.

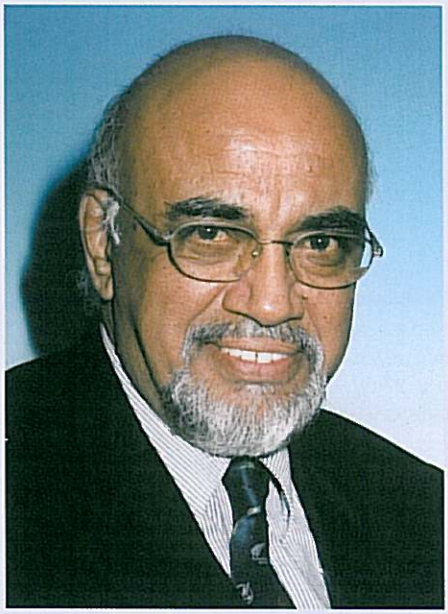


MRS T N ZUNGU

(Alternate to Dr de Waal)

Mrs Zungu is the Chief Director: Audit Services in the Department of Minerals and Energy. She gained her BComm. (Accounting and Auditing) at the University of Zululand, followed by a post-graduate Higher Diploma in Education (Commercial) at the University of Durban-Westville. She received in-house training with Unilever (SA) and Shell (London). Her career spanned a post in the accounts department of Shell SA, a three-year high school teaching post with the Department of Education, and three years in the accounts and auditing division of Unilever. She joined the internal audit division of the DME in 1999 and was promoted to her present post in 2003.

CHAIRPERSON'S FOREWORD



I am happy to be able to report that sustained progress was made during the year up to 31 March 2003 in meeting the NNR's nuclear regulatory responsibilities to the nation, as detailed in the following pages. This progress was coupled with the internal process of organisational transformation and restructuring towards a culture of transparency and staff equity in accordance with the demographic realities of South Africa.

An inescapable fact of life in the nuclear industry in South Africa is the scarcity of skills with which nuclear-based organisations in this country must cope. In the case of the NNR the situation has been exacerbated by several resignations during the past year. The NNR has therefore embarked on a programme of capacity building, which includes internships coupled with professional development programmes. Remuneration levels of staff have also been enhanced in order to attract and retain skilled staff.

The industry enhancement policy of the NNR also extends to meeting its stakeholders' needs and addressing opportunities and problems that may arise. This it seeks to achieve locally by means of improved relations with stakeholders and meaningful contributions to capacity building in the nuclear industry, and internationally through bilateral and multilateral collaboration with foreign regulatory organisations, from which all participants draw benefit.

Looking to the future of the industry, the NNR's policy of exposing high school students to nuclear science through mini-research projects and school presentations on nuclear technology will be sustained. Hopefully this will bear fruit in future tertiary educational intakes and the provision of staff equipped to meet South Africa's nuclear personnel needs.

The NNR's budget for the reporting period was R43.9 million. The major component of the revenue stems from services rendered to holders of nuclear authorisations, mainly Eskom, NECSA and the PBMR project, followed by the mines and smaller users. The Government grant to the Regulator for the reported period was R7,2 million.

It can be reported in general that there were no major concerns regarding the safety related to workers, the public and the environment associated with authorised sites.

I thank the members of the Board of Directors and the sub-committees of the Board (Ad Hoc Finance Committee and the Transformation and Development Committee) for their willing advice and active support during the past year, and the executive and staff for ensuring that the NNR was able to carry out its mandate with competence and efficiency.

K Bharuth Ram

Professor K Bharuth-Ram
Acting Chair, NNR Board of Directors

CHIEF EXECUTIVE OFFICER'S REPORT



One of the major challenges facing the NNR since its establishment has been that of delivery on its prescribed mandate while confronting the transformation imperative as well as the urgent need for capacity building, training and development. Achievement of these objectives with the very limited resources available is undoubtedly a daunting task that could not be achieved in the absence of creative thinking and appropriate planning.

Other challenges relate to ensuring our preparedness to apply fully the regulatory process, taking into account the ever-changing operational environment in which we function. Factors currently requiring our attention include the restructuring of the electricity industry and possibly the impacts on nuclear safety, the limited nuclear skills base in the country, the need for harmonization of the NNR's processes with those of other countries, and the prospect of a new nuclear technology with its accompanying challenges of establishing an authorisation process that meets the objectives of the NNR Act and also sets international standards.

In its Strategic Plan the NNR seeks to organise efforts to meet all the above-mentioned challenges and strike the appropriate balance between competing and sometimes conflicting interests, and to chart its path to meet its objectives over the next three financial years.

The NNR has adopted the balanced scoreboard as its strategy. In this report the Board of the NNR has measured the performance of the organisation in respect of the four elements of its strategy - the core business of the NNR (protection of people and the environment), stakeholder satisfaction, internal business processes and human resources. The NNR is committed to excellence in the implementation of its Strategic Plan, to be achieved through continual improvement in all strategic elements.

On the operational side of the NNR's mandate during the review year, effective regulatory control was exercised to ensure compliance in regard to keeping the exposure of workers to radiation well below the legal dose limit. While there were still records of working areas where the legal dose limit could potentially be exceeded, all efforts were made to limit exposure in accordance with the ALARA (as low as reasonably achievable) principle.

In respect of industry compliance with required standards, an acceptable compliance index of 85% was achieved across all facilities.

Interaction with stakeholders was greatly improved during the year through forums with authorisation holders and other stakeholder forums. These included regular meetings with various labour unions at the Koeberg Nuclear Power Station and local authorities around the power station.

On the international front, the NNR hosted an IAEA workshop on the transport of radioactive materials, which was attended by all IAEA African member states. In respect of reportable incidents, the Greenpeace intrusion into the perimeter of the Koeberg Nuclear Power Station on 24 August 2002 was given urgent attention. The NNR investigation identified a need for enhancement of Eskom's security measures. Eskom's implementation of a plan to further improve security is monitored on an ongoing basis.

The NNR continued with the review of submissions relating to Eskom's application for a nuclear installation licence for the Pebble Bed Modular Reactor as well as the application for the related fuel plant. Full information is given on this project elsewhere in this annual report.

In conclusion, I wish to express my sincere appreciation to the Board of the NNR, the Minister of Minerals and Energy and through the Director-General, to the Department of Minerals and Energy for the guidance and support they have offered to me personally and to the organisation. I also pay special tribute to the management and staff of the NNR for their efforts during the year under review. We are united in our commitment to continuous improvement in the delivery of our mandate to protect the public, property and the environment of South Africa against the risk of nuclear damage, and will continue to meet our obligations as required by legislation and to the best of our ability.

Louisa B Zondo
Chief Executive Officer

KOEBERG NUCLEAR POWER STATION

BACKGROUND

Eskom operates one twin 900 MWe unit Pressurised Water Reactor (PWR) nuclear power station, Koeberg , located some forty kilometres north of Cape Town on the Atlantic Ocean Coast. The station was built by a French consortium with Framatome having responsibility for the nuclear island, Alsthom Atlantique for the conventional island, Spie Batignolles for the civil work and Framateg with the overall Project Co-ordination. Following the Regulator's satisfactory review of the Nuclear Licence application, the first Nuclear Licence NL-1 was issued to Eskom, for the construction of the power station which commenced in 1976. The two units were brought into commercial operation in July 1984 and November 1985 respectively.

In terms of the National Nuclear Regulator Act (NNRA), nuclear installation licences are subject to any conditions deemed necessary to ensure the protection of persons, property and the environment against nuclear damage. The current Koeberg Nuclear installation Licence NL-1 variation 14 is subject to 16 such conditions which included specific licensing requirements and control pertaining to :

- Plant description and configuration
- Safety assessment
- Scope of activities that may be undertaken
- Controls and limitations on operation
- Maintenance and In Service Inspection
- Operational Radiation Protection
- Effluent Management
- Waste Management
- Environmental Monitoring
- Emergency Planning and Preparedness
- Transport
- Physical Security
- Quality Management
- Acceptance and Approval
- Reports
- General

In terms of Section 26(1) of the NNRA Eskom, the nuclear licence holder, implements an inspection programme to ensure compliance with the conditions of the Nuclear Installation Licence NL-1.

Likewise the NNR also implements an independent system of compliance inspections to provide assurance of compliance with the conditions of the nuclear licence in terms of section 5(d) of the NNR Act.

The Regulatory approach to licensing of nuclear installations like KNPS is largely based on risk and the application of international safety standards.

SAFETY ASSURANCE

1. OCCUPATIONAL EXPOSURE TO RADIATION

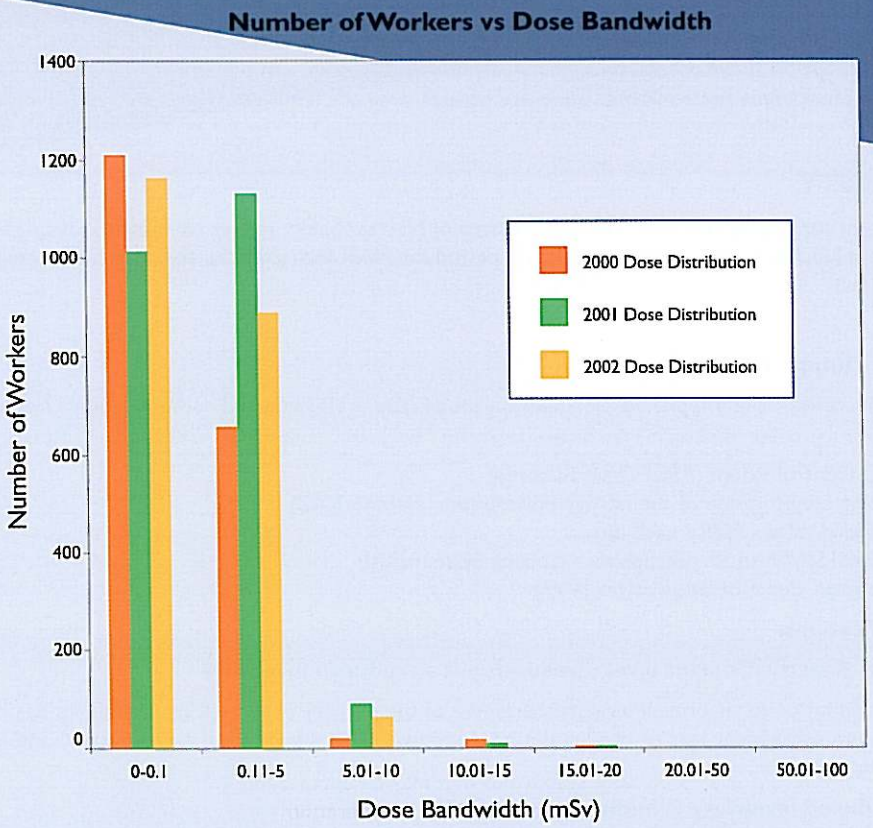
Radiation exposures to personnel working at Koeberg are subject to control by the operational radiation protection programme. This programme ensures that control within the annual individual dose limit is achieved. In addition, the programme also serves to ensure that all doses are kept as low as reasonably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

The highest annual individual dose accrued during 2002 was 15.07 mSievert (mSv) compared to the regulatory limit of 50 mSv per annum. The total annual collective dose to the workforce for the year was 1.59 person-Sv. The total occupationally exposed workforce during 2002 numbered 2126 indicating an average annual individual dose of approximately 0.75 mSv. Figure 1 illustrates the dose distribution arising from the individual exposures accrued during 2002.

A major contribution to the total collective dose was the work performed during refueling outage 212 where 1.15 person-Sievert was accrued. The collective dose accrued as a result of the outage contributed 72% of the total annual collective dose recorded for 2002.

In terms of the occupational exposure there were no concerns regarding the safety of workers at KNPS.

Figure 1: Occupational Exposure



2. PUBLIC EXPOSURE TO RADIATION

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 control 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 on public exposure to radioactive releases is maintained.

Radioactivity in liquid and gaseous effluent discharges from Koeberg during 2002 contributed a total individual dose of 0.54 mSv to the hypothetically most exposed group. The dose as a result of gaseous and liquid effluent discharges was 0.19 mSv and 0.35 mSv respectively, which is well within the NNR limit of 250 mSv per annum.

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 2002

Atmospheric Transport Pathway		Liquid Transport Pathway	
Radionuclide	**% of AADQ**	**Radionuclide**	**% of AADQ**
^{134}I	35.95	^{57}Co	9.97
^{132}I	8.75	^{125}Sb	58.91
^{3}H	47.65	^{110m}Ag	7.74
^{60}Co	21.38	^{3}H	13.43

There were no concerns regarding the safety of the public living around KNPS during the reporting period.

3. ENVIRONMENTAL SAFETY

The Koeberg Environmental Surveillance Programme, involving sampling and analysis of representative environmental media, is performed in order 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 surface water in land or in seawater. Sensitive gamma spectrometric measurements of biological materials, soil and air samples, vegetation and food, did not reveal any contamination, although very small quantities of ^{110m}Ag and ^{58}Co, 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 Koeberg effluent could be identified in sewage sludge, while reportable

activities of ^{131}I, 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 monitor 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.

4. NUCLEAR SAFETY

As in previous years a major part of the NNR work in the area of Nuclear Safety relates to in-depth safety assessments associated with the Koeberg Nuclear Power Station. During this period the NNR focused its safety assessment activities on the main areas summarized below:

4.1 Plant Refueling Outage 113 Modifications

The NNR completed its review of and approved the following modifications implemented during Koeberg Unit 1 refueling outage 113.

- Replacement of the Control Room (KSC) Trend Recorder
- Changes to the piping configuration of the nitrogen distribution system (RAZ) (Power Operated Relief Valve - PORV back up)
- Replacement of valve 155VN on the Component Cooling System (RRI)
- Modification to the main steam isolation Valves (VVP)

Other major modifications:

(i) Improved Primay Reactor Coolant level measurement at reduced inventory

Eskom submitted a modification for improved level measurement of the primary circuit during draindown to prevent cavitation of the cooling pumps and subsequent loss of cooling during shutdown. This modification was approved and implemented on both Koeberg units .

(ii) Operation at reduced inventory ("midloop operation")

This modification was not approved by the NNR.

4.2 Koeberg Safety Base Optimisation

As an integral part of optimization of Koeberg safety, Eskom has already implemented a number of initiatives to further mitigate the impact of hypothetical severe accidents should they occur. A number of submissions made by Eskom to the NNR over the past few years may be linked to these initiatives. These include the Severe Accident Management Guidelines for accidents initiated from full power operation, Severe Accident Management Guidelines for accidents initiated from shutdown conditions, Koeberg strategy on hydrogen control, updating the Koeberg late phase emergency plan and an updated probabilistic risk assessment for Koeberg using state-of-the-art modelling and computer codes. As part of these initiatives a number of modifications linked to severe accident management are also being investigated by Eskom.

In terms of severe accidents the NNR has identified a number of technical issues which will need to be satisfactorily resolved before the relevant modifications can be implemented on the Koeberg units. Since these issues are also part of international initiatives the NNR is independently ascertaining the views and positions of regulators internationally in this regard.

4.3 Koeberg Nuclear Fuel Management Strategy

The two Koeberg reactors are designed to be loaded with 157 fuel assemblies each. During a refueling outage, which takes place approximately every 15 months per reactor, 52 used fuel assemblies are discharged and transferred to the spent fuel pool for storage and replaced with 52 fresh fuel assemblies. The fuel pellets are enriched to a maximum of 4.95% 235U. Currently the 235U enrichment in the unit 1 reactor is limited to 4.4% and for the unit 2 reactor it is limited to 3.9%.

(i) United States (US) - designed fuel

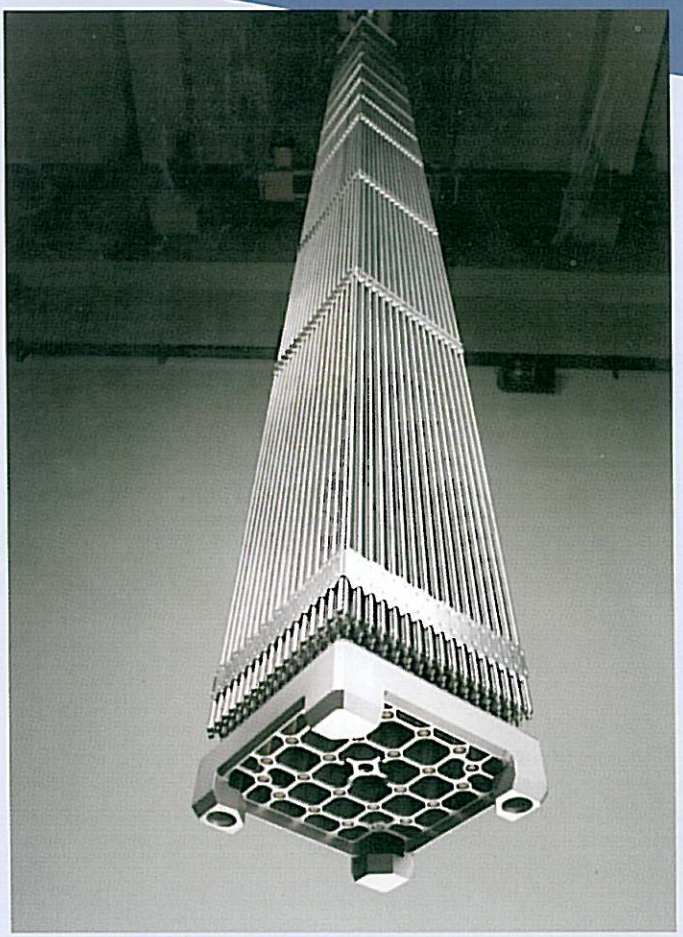
Approval was given to load fuel assemblies enriched up to 4.4% 235U and supplied by a US company (Westinghouse), into the unit 1 reactor. The loading of the fuel was subject to the assessment of a comprehensive safety case demonstrating that the design bases of the reactor were not adversely impacted by the introduction of the higher enrichment and the changes in the fuel assembly design.

(ii) French - designed fuel

A safety case was also submitted by Eskom, assessed and approved by the NNR to load 4 advanced fuel assemblies, manufactured by a French company (Framatome) , in the unit 2 reactor core. These design changes included the introduction of a new cladding alloy which exhibits inter alia improved corrosion properties. The improved fuel designs demonstrated a very high level of thermal hydraulic performance, reliability in operation, reliability during fuel handling and repairability.

The next step in this process is the approval for licensing of a full reactor core to be loaded, with the improved Framatome fuel AFA-3GA with an enrichment of 4.40 % 235U, during the next refuelling outage on Koeberg unit 2 which is scheduled for October 2003. The scope of the work includes inter alia the review of a comprehensive safety case and more than 40 Eskom review reports on these analyses. Specialists in the NNR are currently performing assessments on these submittals.

A typical Framatome AFA-3GA fuel assembly is presented in Figure 2



4.4 Materials Integrity

In order for the nuclear power station to maintain its design basis it is imperative that the materials used in its construction do not degrade to an extent that those individual systems, structures and components are unable to meet their design intent.

All of the materials that are employed in the construction of the Nuclear Power Station are subject to various forms of degradation throughout the life of the plant. This ageing process is a characteristic of the type of material and of the environment in which it is used.

The bulk of the materials of interest to the NNR include steels (both ferritic and austenitic), nickel-base alloys and concrete. The environments most likely to contribute to material degradation include:

- The marine environment at Koeberg
- High temperature water with associated fluctuations in temperature
- Inherent stresses in the components, mainly residual stresses arising from construction but also imposed stresses from operational loadings.

Examples of degradation that have arisen in the pressurized water reactor industry worldwide are:

- Stress corrosion cracking of steam generator tubes,
- Irradiation embrittlement of the reactor pressure vessel
- Thermal fatigue of branch pipes to the primary circuit
- Marine environment stress corrosion of safety related pipework
- Stainless steel elbows contaminated with foreign material from construction
- Reactor pressure vessel head penetration cracking and consequent corrosion of the head
- Marine environment corrosion of the aseismic foundation bearings
- Stress corrosion cracking of valve actuator stems
- Boric acid corrosion of flange bolts
- Marine environment corrosion of ventilation systems
- Stress corrosion cracking of pump impellors
- Marine environment corrosion of diesel generator radiators
- Microbiologically assisted corrosion of storage tanks
- Thermal embrittlement of primary circuit cast elbows

All of the above examples have either occurred at or have the potential for occurrence at Koeberg Nuclear Power Station.

From worldwide and NNR's experience as well as Eskom's expertise anticipatory measures have been established and installed in order to ensure, with sufficient confidence, that material degradation does not make a significant negative impact on the risk imposed by the Koeberg Nuclear Power Station, to the public and to the environment. However, the NNR is aware that there will always exist the propensity for new degradation mechanisms and/or affected components to arise. Hence, the required

inspection and testing programmes indicated earlier in the report are designed to cover a sufficiently wide field in order to minimize any such surprises. This approach works in parallel with keeping abreast of new developments from plant experience worldwide by both the NNR and the plant operator Eskom.

Plant Condition Management is a programme that is required by the NNR, through the licensing process, to be set up and run by Koeberg Nuclear Power Station in order to ensure that the normal processes of material ageing do not result in a significant nuclear risk in the operation of the plant.

Such a programme incorporates regular periodic inspections of systems, structures and components as well as a systematic programme for the maintenance of functional components whose potential failure has been established as risk significant.

All aspects of this programme are subject to scrutiny and acceptance by the NNR. The bases for this programme and its sub-programmes are required to be in conformance with international norms and standards.

Preventive and condition-based maintenance form the backbone of ensuring that component reliability remains in line with the probabilistic risk-based model that is used by the NNR to demonstrate that the power station continues to operate within the safety criteria laid down by the NNR as part of its nuclear licence requirements.

In-service inspection and testing is another sub-programme that, through a process of regular and repetitive non-destructive inspections and functional testing, ensures that the normal process of degradation and ageing are well controlled. Degradation mechanisms such as corrosion, fatigue, wear-out and irradiation embrittlement are inspected for as part of this sub-programme. Once detected, the affected component is assessed as to its fitness-for-purpose and any necessary corrective action, including possible repair or replacement of the affected component. Functional testing of active components also ensures that these components are able to meet their design intent in terms of operational readiness and function. Such components include valves and pumps whose correct performance is important to the safe operation of the plant both during normal operation and also during anticipated off-normal situations.

4.5 Probabilistic Risk Assessment

Eskom submitted a revision of the Koeberg Probabilistic Risk Assessment (PRA) in 2002 which was intended to address findings of the Koeberg periodic safety review completed in 1999, and to utilise state-of-the-art risk assessment methodology. The NNR is in the process of reviewing this submission. As part of the NNR's assessment process, a series of workshops have been held with specialists from the regulatory authorities in France and Belgium over the past two years to compare certain aspects of the risk assessments performed on French and Belgian plants which are of a similar design to that of the Koeberg Nuclear Power Station. This comparison work is anticipated to be completed towards the first half of 2004 .

5. LICENSING OF KOEBERG REACTOR OPERATORS

The NNR is responsible for the licensing of control room operators in accordance with NNR requirements which include conformance with acceptable international standards. The NNR Koeberg Programme discharges this responsibility by controlling, maintaining and administering the licensing of reactor operators at the power station.

The nuclear licence for Koeberg (Condition 4) requires that only operators licensed by the NNR are allowed to operate the control panels of the Koeberg power station. For this purpose the NNR and Eskom recently agreed to adopt the United States Nuclear Regulatory Commission (USNRC) evaluation methodology for licensed candidates and adapted the evaluation criteria to suit South African environmental requirements. A process has also been established whereby Eskom is allowed to prepare and implement the examinations. The approval of the examination and the issuance of licences remains however the responsibility of the NNR. During the implementation of examinations the NNR either leads the examinations and/or observes the performance of the Eskom evaluators to ensure consistent application of the standards and criteria.

Eskom put forward two Senior Reactor Operator (SRO) and four Reactor Operator (RO) candidates for initial licence examinations during the reporting period. All the candidates put forward were successful. History was made during the examinations when the first female, Sonya Genever, received her licence from the NNR as a RO.

6. RADIOACTIVE WASTE SAFETY

The generation of solid radioactive waste amounted to 89.04 m^3 drummed in metal drums and 30.21 m^3 drummed in concrete drums. The inventory of the drummed radioactive solid waste produced in 2002 is given in Table 2.

TABLE 2:

INVENTORY OF SOLID RADIOACTIVE WASTE PRODUCED IN 2002 AND DRUMMED IN VARIOUS TYPES OF DRUMS.

Type of solid radioactive waste	No. of drums
C1 drums containing non-compressible waste	15
C1 drums containing concentrates	39
C1 drums containing resin	15
C2 drums containing resin	31
C4 drums containing filters	4
C2F drums containing filters	4
210 litre metal drums containing general trash	492
210 litre metal drums containing resin	96

Radioactive waste shipped to Vaalputs in 2002 amounted to 204.19 m^3 in steel drums.

There were no safety concerns regarding radioactive waste management at KNPS.

7. TRANSPORT SAFETY

Fuel consignments on site	1
Radwaste consignments	7
Other materials (sealed sources etc) onsite/offsite	9/13

There were no incidents involving transport of radioactive material and all consignments complied with safety requirements.

8. EMERGENCY PLANNING AND PREPAREDNESS

(i) Koeberg Emergency Exercise

One of the responsibilities of the NNR in terms of the NNR Act is to ensure that provision for emergency planning is in place. To this end the NNR reviews the emergency planning arrangements for adequacy and conducts emergency exercises at Koeberg approximately every eighteen months. The focus of these exercises is varied in order to test different aspects of the emergency plan.

The February 2002 emergency exercise was designed to test both the on-site and off-site organizations (Koeberg and local authorities respectively) and to conduct a live test of the evacuation of people from within the 5 km zone of Koeberg to a mass care centre and the functioning of the mass care centre.

Overall, the exercise was considered a success. Problems and potential improvements were recorded by the umpires and observers, and reported at follow-up sessions following the exercise. The NNR prepared a report on its conclusions and recommendations which was circulated to the participants in the exercise. The implementation of the corrective actions is being followed up in various forums, primarily the Emergency Planning Committee chaired by Eskom and attended by local authorities, and monitored by the NNR at the regular monthly Koeberg Licensing Liaison Comitteee (KLLC) meeting held between Eskom and the NNR .

(ii) Koeberg late phase emergency plan

During 2002 it was decided that the late phase aspects currently in place in the Koeberg emergency plan should be revisited. This was prompted partly by new requirements from the NNR Act (e.g responsibilities of the Western Cape provincial administration in the Koeberg emergency response), the development of other national legislation such as the Disaster Management Act and from discussions with the Chief Director Emergency Management in the Western Cape . For this purpose the (Koeberg) Emergency Planning Steering and Oversight Committee (EPSOC) was established. The NNR requirements and further guidelines for late phase planning were presented and discussed at committee meetings. The NNR attends this committee's monthly meeting, in an observer capacity. As the NNR will eventually approve the late phase plan, this helps to ensure that the project keeps on track in terms of NNR requirements.

(iii) Regulations under section 38(4) of the NNRA

In terms of section 38 (4) of the NNRA the NNR made recommendations to the Minister : Minerals and Energy, pertaining to regulations on the development surrounding any nuclear installations to ensure the effective implementation of any applicable emergency plan. In terms of the NNRA the Department of Minerals and Energy is progressing these regulations further.

The NNR considers that these regulations are of vital importance to control the developments surrounding the Koeberg Nuclear Power Station in order to ensure the effective implementation of the Koeberg Emergency Plan at all times. Such developments are currently monitored at the Koeberg Environment Development Committee (KEDC) forum.

9. PHYSICAL SECURITY

The licensing requirements pertaining to physical security , to which Eskom must comply, are contained in Condition 12.0 of the Koeberg Nuclear Licence NL-1 variation 14.

This Condition specifically refers to a security standard which was developed by Eskom in consultation with the security establishment in the country. The NNR accepted the standard, and compliance with this standard is effectively included in the condition of licence.

As part of its compliance assurance programme, the NNR conducts regular inspections (on a weekly basis) at Koeberg to verify conformance to this standard.

The adequacy of the physical security arrangements at Koeberg were investigated following the Greenpeace incursion on 24 August 2003 and improvements implemented.

10. INSPECTIONS AND AUDITS

The NNR independently conducted approximately 900 inspections at Koeberg during the reporting period 2002/03.

A safety indicator system is used by the NNR to record and grade findings arising from the compliance assurance and assessment activities. The regulatory concerns are ranked according to a colour-coded system in terms of their severity: red – unacceptable, orange – tolerable high, yellow –tolerable medium, blue – tolerable low, green – below regulatory concern.

The main concern (red) on which the NNR has required Eskom to provide a corrective action plan, relates to configuration control in the areas of project engineering and procedure development. This concern is based on the number of significant errors detected by the NNR during assessments and inspections on design and procedure changes. While corrections to the errors were carried out, the concern is that the processes were not working effectively.

An audit was performed to assess the degree of compliance of the In Service Inspection Programme (ISIP) to license require-

ments and the Koeberg Licence Basis Manual. In general the ISIP requirements are being met but numerous process weaknesses were evident which, if left un-attended, may impact on the future ability to perform regulatory requirements. The audit resulted in 6 findings and 5 observations being raised. The NNR is monitoring the implementation of the corrective actions.

The NNR also conducted a surveillance on Staffing levels, Qualifications and Experience. The surveillance team found that acceptable standards have been adopted and processes implemented at Koeberg to assess whether the plant organization, staffing levels, qualifications, experience are adequate to meet nuclear safety requirements. Comparison of staffing levels shows a mismatch with corresponding international norms in some areas (Engineering, Safety, and Technical Support). Koeberg management has identified strategies for addressing the identified organisational weaknesses. These include improved training, outsourcing of engineering (design group), changes made to the organisational structure, strategy to use fewer but better qualified procedure writers, and consideration of conducting modifications in batches. The NNR is monitoring and assessing the effectiveness of the implementation of these strategies.

INCIDENTS/OCCURRENCES

A total of 311 incidents / occurences were reported in the following categories:

Category	Number of incidents / occurences
1	1
2	24
3	286

Category 1 requires immediate notification, Category 2 requires 24 hour notification and Category 3 requires quarterly notification.

The NNR monitors incidents / 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 scrutinises 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 (Electricite de France). Apart from monitoring Eskom processes in this regard, the NNR similarly scrutinises information from the IAEA and information exchanged with other regulatory bodies through bilateral agreements.

Through the above means, the NNR satisfies itself that the processes implemented at Koeberg relating to incidents / occurrences are acceptable and that plant safety performance is acceptable.

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

The most important events investigated and followed up by the NNR during this reporting period are as follows:

(i) Leaking steam generator manway gaskets

Due to problems experienced with leaking gaskets on two steam generator manways after Koeberg Unit 2 start-up following refuelling outage 212, Eskom approached the NNR with a Safety Case for operation at reduced primary coolant system inventory - at Low Working Level. The purpose of this proposal was to allow replacement of gaskets without unloading the fuel from the reactor into the spent fuel pool.

After a detailed review the NNR did not approve this proposal. Consequently the replacement of gaskets, which was successfully carried out by Eskom, could only be undertaken after unloading the fuel from the reactor. During the review process the NNR initiated contacts with other nuclear regulatory authorities (Belgian and French) and received useful feedback from these organisations.

(ii) Greenpeace event (Category 1)

Eskom notified the NNR of the Greenpeace incursion into the plant which took place on Saturday 24 August 2002. The NNR conducted interviews with Koeberg management and security personnel on 24-25 August, and conducted an inspection of the plant in the vicinity of the pumpstations on 27 August.

As requested by the NNR, Eskom has submitted to the NNR details of immediate corrective actions to prevent reoccurrence of such event and longer term corrective actions. The NNR conducted a follow-up inspection to establish that the immediate corrective actions measures referred to have been implemented. Based on this initial investigation and the corrective actions implemented, the NNR concluded that there was no challenge to the nuclear safety arrangements at the plant, but nevertheless the NNR conducted its own detailed assessment of the event. This included further interviews with Koeberg management and security personnel and an independent assessment of the security arrangements at Koeberg relating to the event. This investigation identified some areas requiring some corrective actions and improvements which were transmitted to Eskom.

This event was also investigated by the Department of Minerals and Energy and the Minister has requested certain corrective actions, including the testing of the Koeberg security arrangements by regular exercising.

Eskom has developed a plan to further upgrade security at Koeberg, whose implementation is being monitored by the NNR.

BACKGROUND

Established as a public company in terms of the Nuclear Energy Act, Act 46 of 1999, Necsa is wholly owned by the State and currently comprises of two entities, Pelindaba Nuclear Institute and the commercially driven Pelindaba Technology.

Necsa develops and utilizes nuclear technology as part of the National System of Innovation. Its growth strategy, Vision 2010, is aimed at contributing to national and regional socio-economic development in line with the New Partnership for Africa's Development. The primary functions of Necsa are to undertake and promote research and development in the field of nuclear energy and radiation science and technology; to process source material, special nuclear material and restricted material; and to cooperate with persons in matters falling within these functions. Further, Necsa is also responsible for operation of the Vaalputs National Radioactive Waste Disposal Facility.

In terms of the NNR Act NECSA (Pelindaba) is authorized by Nuclear Licence NL-27.

Necsa employs some 1400 people in diverse areas such as chemistry, electronics, engineering and physics. The research reactor at Pelindaba, SAFARI-1, which has ISO-9001 accreditation, is one of the most commercialised research reactors in the world.

As a consequence of the downscaling of activities on the Necsa site, operations at a number of facilities have been discontinued. Subsequent to such discontinuation, decommissioning activities are performed in three different phases:

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

Phase 2: 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.

Phase 3: 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.

SAFETY ASSURANCE

1. OCCUPATIONAL EXPOSURE

The controls over occupational exposure were comparable to the best practice internationally. The average effective radiation dose per occupationally exposed worker for 2002 was 0,51 mSv, which is 10% of the ALARA objective of 5 $mSv.a^{-1}$.

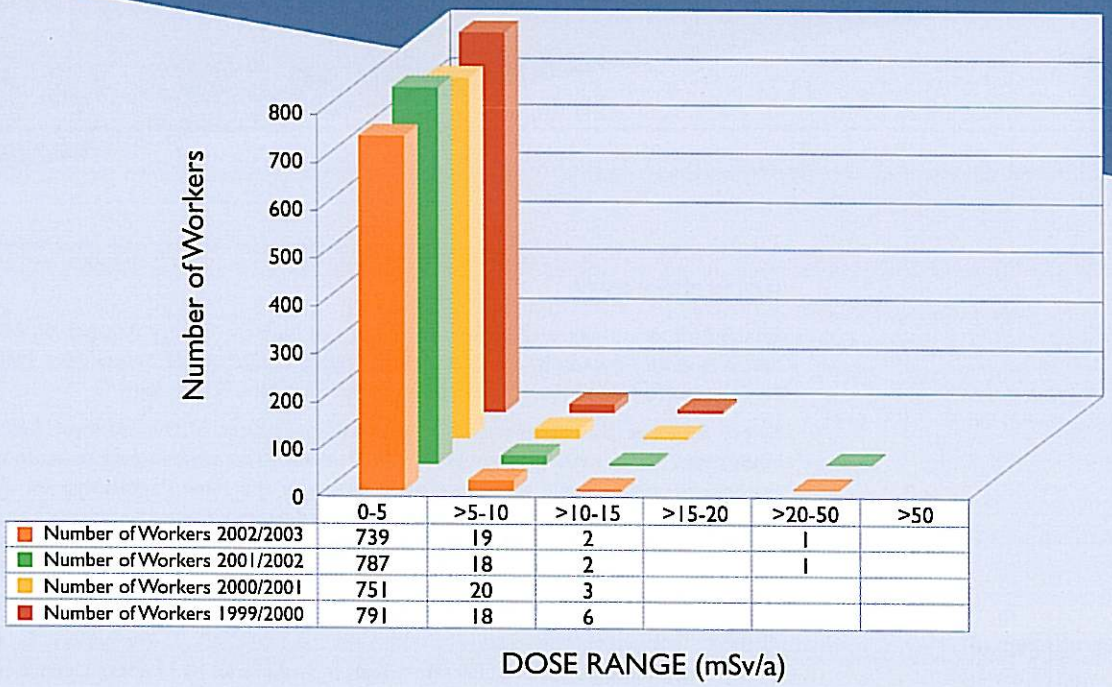
Whilst the ALARA objective for the maximum individual dose (20 $mSv.a^{-1}$) was exceeded for one individual, the dose limit (50 $mSv.a^{-1}$) was not approached.

Maximum Dose ($mSv.a^{-1}$)	12.3
Average Dose ($mSv.a^{-1}$)	0.51
Total Collective Dose (Person sievert)	0.415

In addition it should be noted that an incident resulting in a exposure of 36.38 $mSv.a^{-1}$ occurred in August 2002 during the handling of eqiupment for external tracer tests with regard to the Driefontein mine.

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

Figure 3:



	0-5	>5-10	>10-15	>15-20	>20-50	>50
Number of Workers 2002/2003	739	19	2		1	
Number of Workers 2001/2002	787	18	2		1	
Number of Workers 2000/2001	751	20	3			
Number of Workers 1999/2000	791	18	6			

2. PUBLIC EXPOSURE

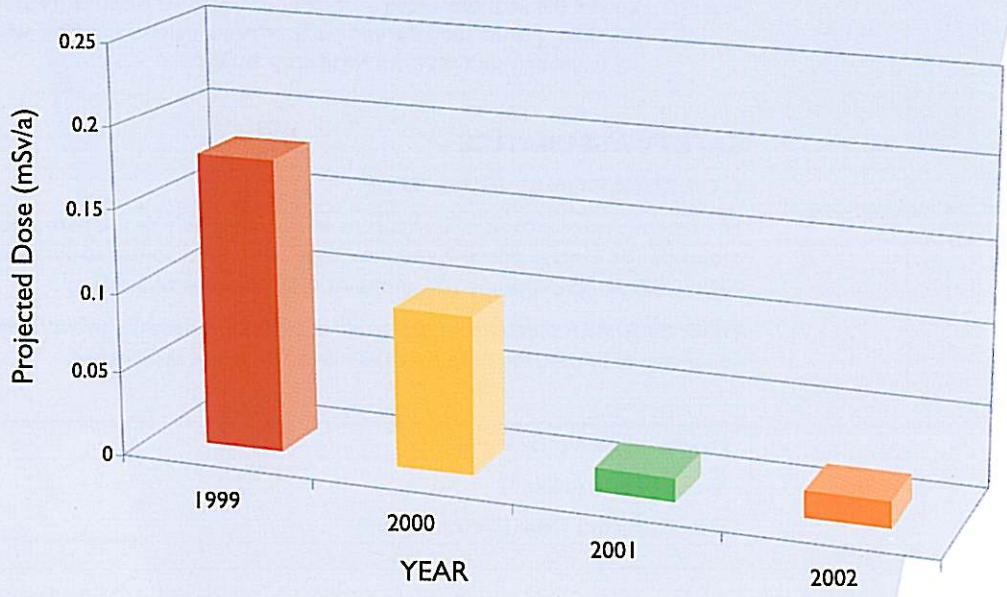
The projected public exposure arising from liquid and gaseous effluent discharges was 0.021 mSv, which is well within the dose limit of 0.25 $mSv.a^{-1}$. Liquid effluent discharges accounted for a projected dose of 0.017 mSv and gaseous discharges accounted for a projected dose of 0.003 mSv for the 2002 calendar year.

The following figure compares the doses as a result of liquid effluent discharges to the Crocodile River for the last four years.

There were no safety concerns regarding public exposure to the community living around NECSA.

Figure 4:

PUBLIC EXPOSURE DUE TO LIQUID EFFLUENT RELEASES TO THE CROCODILE RIVER



3. ENVIRONMENTAL SAFETY

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. A widespread network of Environmental Thermo-Lumenescent (TLD's) monitors the external exposure arising from gaseous effluents. There were no indications of external radiation above normal background.

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.

4. NUCLEAR SAFETY

The NNR approved 57 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 2002/2003

Safety assessments	27
Facility operational technical specifications	2
Facility in-service inspection manuals	2
Radiation protection standards	6
Facility security manuals	5
Facility quality management manuals	3
Facility care and maintenance procedure	1
Transport containers (also revalidation of certificates, special form certificates & package design)	6
Facility decommissioning & decontamination procedures	5
Total	**57**

SAFARI-1

The SAFARI-1 Research Reactor was the first nuclear reactor to be built in the Republic of South Africa. SAFARI-1 is a tank-in-pool type, light-water-moderated and cooled, beryllium and water reflected research reactor designed and built as a general research tool, falling into the class of research reactors commonly known as Material Test Reactors (MTR). The fundamental design of SAFARI-1 is similar to the Oak Ridge Research Reactor (ORR) in the United States, the High Flux Reactor (HFR) in the Netherlands and the STUDSVIK R2 Reactor in Sweden.

SAFARI-1 is designed to accommodate a wide variety of irradiation experiments for medical, industrial and research applications. The reactor vessel is located in the reactor pool, which is surrounded by a high-density concrete biological (radiation-absorbing) shield. This provides the necessary shielding for operations from above the core and at poolside facilities while the reactor is in operation.

The reactor is fuelled by highly enriched Uranium (HEU) contained in modified MTR-type fuel elements. It uses light water for the coolant and neutron moderation purposes and it is currently licensed to operate at a maximum power level of 20MWth.

The first Safety Analysis Report (SAR) for SAFARI-1, PEL-75, dates back to 1965 when operation of SAFARI-1 started.

An extensive safety re-assessment of the SAFARI-1 SAR was initiated by Necsa in 1998 to incorporate all changes and modifications previously approved by the NNR by way of Licence Change Requests (LCR's).

Necsa submitted the first revision of the revised SAR to the NNR during September 2000 for NNR review. Since then the document underwent a series of iterations whereby NNR comment on the document was incorporated.

NNR review of the SAR continued through the reporting period and a recommendation for approval of the SAR for incorporation into the Necsa Licence was made to the NNR Executive Committee in March 2003.

5. RADIOACTIVE WASTE SAFETY

The following table reflects the radioactive waste generated at Necsa during the reporting period:

Waste container	Number of containers
Metal drums (200 L)	94
Metal drums (160 L)	728
Metal drums (25 L)	4
Metal drums (other sizes)	89
Concrete drums	50
Plastic drums (100 L)	4
Plastic drums (25 L)	9
Other type containers	1

In April 2002 the NNR approved the use of the Necsa Pelstore, an under-roof storage area of approximately 260m x 60m in Area 14 of the Pelindaba site, for storage of radioactive waste. During the reporting period a total of 3416 radioactive waste containers were transferred to the Pelstore from the following areas on the Pelindaba site:

- Thabana,
- Building P-2800,
- Building B-5,
- Building P-2400,
- the Bus Shed,
- X-Building and
- Area 16.

The total number of radioactive waste containers within the PELSTORE was 21620 at the end of the reporting period..

There were no safety concerns regarding radioactive waste management at NECSA (Pelindaba).

6. TRANSPORT SAFETY

Internationally the New IAEA Transport Regulations as detailed in IAEA document TS-R-1, were brought into full adoption as from 1 January 2002. In keeping with international practices the NNR formally adopted the new regulations as at this date. The most significant difference between the old and the new Regulation is the nuclide specific definition of radioactive material contained within TS-R-1.

The NNR approved the following transport containers/certificates, using the new Transport Regulations TS-R-1, during the reporting period:

There were 31 shipments during the reporting period and no safety concerns regarding exposure to workers, public and the environment.

Certificate Number	Expiring Date
ZA/NNR 1004/B(U)-96	13 May 2007
ZA/CNS 1004/B(U)-85	13 November 2002
ZA/004/S (Rev. 4)	31 October 2002
ZA/NNR/004/S-96 (Rev. 5)	10 November 2007
ZA/2043/B(U)-96 (Rev. 19)	30 November 2007

7. EMERGENCY PLANNING AND PREPAREDNESS

In compliance with section 38 of the National Nuclear Regulator Act (Act No 47 of 1999), Necsa has in place a comprehensive emergency plan. Over the reporting period 57 building emergency exercises and 4 table top exercises were conducted by Necsa. These exercises tested the various aspects of the Necsa site emergency plan, in terms of possible chemical and radiological hazards.

8. PHYSICAL SECURITY

As a result of worldwide events in the recent past and efforts by the IAEA and its Member States to raise the levels of security related to nuclear material and radioactive sources, the NNR has issued directives to Necsa to review the physical security measures for all types of nuclear material under Necsa control, to assure the NNR that the security measures in place for these materials are still at the levels required to assure their safety.

9. INSPECTIONS AND AUDITS

During the reporting period NNR inspectors performed a total of 161 compliance inspections on the Necsa site. These inspections covered all aspects of the licensing conditions. During these inspections the percentage compliance was determined to be 91 percent. Therefore compliance was acceptable in general.

INCIDENTS / OCCURRENCES

In accordance with the requirements of Licence Document LD-1001 incidents / occurrences are classified as:

- Category 1, where immediate NNR notification is required,
- Category 2, where NNR notification is required within 24 hours and
- Category 3, where NNR is informed on a quarterly basis.

A total of 89 incidents / occurrences were reported during the reporting period. Of the reported incidents / occurrences 41 were classified as category 3, 47 were classified as category 2, whilst there was one category 1 occurrence.

In terms of description the 89 incidents / occurrences can be classified as follows:

Category – description	Number
200 – Exceeding of investigation level	21
201 – Contamination	7
202 – Releases	8
203 – Explosion / Fire	2
204 – Non-compliance criticality	10
205 – Non-compliances found RP/HSE audit	2
206 – Non-compliance documents	15
207 – Theft, loss of material	2
208 – Other (E.g. Equipment failure, scram, etc.)	22
Total	**89**

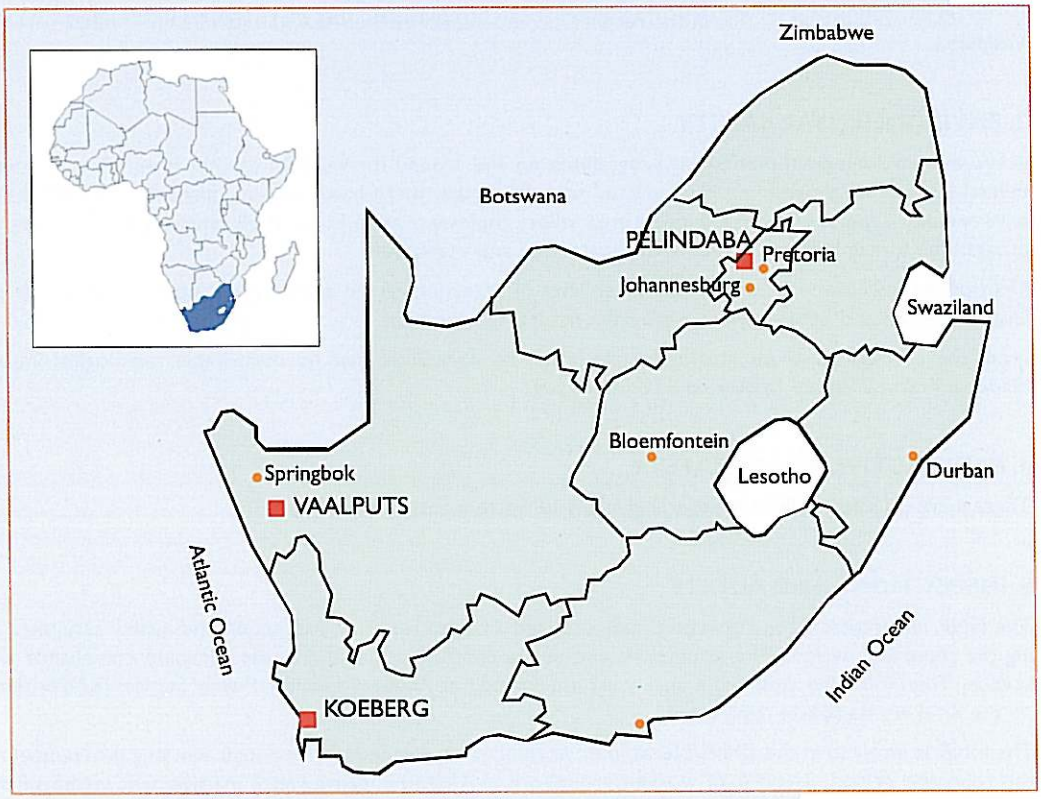
VAALPUTS

BACKGROUND

Vaalputs, the National Radioactive Waste Disposal Facility, is situated in the Northern Cape Province, approximately 90 km southeast of Springbok, which is the closest town, and 200 km from the Namibian border. It is located on the western edge of the Bushmanland Plateau, and extends some way into the Kamiesberg, which forms part of the Namaqualand rocky hills. The farm Vaalputs covers an area of approximately 10 000 ha, and the disposal site is situated in the western half and is 99.54 ha (900 m x 1106 m) in extent.

Vaalputs came into operation in 1986 and is mainly used for the disposal of low-and intermediate level waste from Koeberg in near surface trenches. Vaalputs went through a detailed screening, selection and characterization process and a nuclear licence for the disposal of radioactive waste at Vaalputs was granted in February 1990 (Licence No. NL-28).

Location of Vaalputs in relation to Pelindaba (Necsa) and the Koeberg Nuclear Power Station



SAFETY ASSURANCE

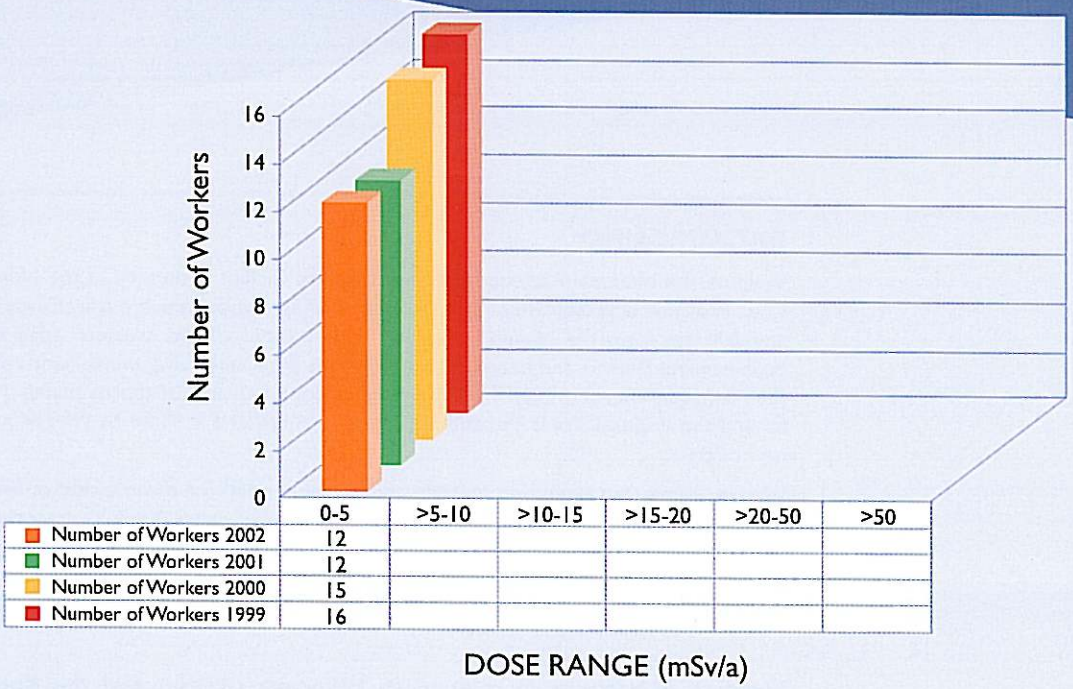
1. OCCUPATIONAL EXPOSURE

The controls over occupational exposure were comparable to the best practice internationally. The average effective radiation dose per occupationally exposed worker for 2002 was 0,49 mSv.

Maximum Dose (mSv.a^{-1})	1.00
Average Dose (mSv.a^{-1})	0.49
Total Collective Dose (person-Sv)	.0058

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

Figure 5: Occupational Exposure - Vaalputs



2. PUBLIC EXPOSURE

Based on environmental surveillance programme it can be concluded that there was no safety impact on the public living around Vaalputs.

3. ENVIRONMENTAL SAFETY

A routine environmental monitoring programme on and around the Vaalputs site has been in place since 1984. This environmental monitoring programme is conducted to confirm that there have not been any releases from the Vaalputs site into the environment. Due to the climate in the area, where the evaporation is about 36 times higher than the rainfall, the monitoring programme is mainly focused at borehole water, soil and vegetation.

Most of the nuclides were below the lower level of detection of the analytical equipment. Detectable concentrations, mainly Uranium, Alpha and Beta activities were from natural radioactivity.

From the environmental monitoring results it can be concluded that no measurable radiological impact from the Vaalputs National Waste Disposal Facility could be detected.

4. RADIOACTIVE WASTE SAFETY

There were no safety concerns regarding safety of waste management at Vaalputs.

5. INSPECTIONS AND AUDITS

The NNR undertook three inspections and attended a Necsa radiation protection and quality assurance audit at Vaalputs during the reporting period. The inspections and audits concluded that there was adequate compliance with the conditions of licence. The NNR also attended a quality assurance audit at Koeberg Nuclear Power Station (KNPS) during September 2002, on the Koeberg Radwaste department.

The NNR is involved in the KNPS/Necsa joint working group's meetings. Two joint working group meetings took place during this reporting period. These joint working groups are looking to improve waste management systems from design to disposal. One of the outcomes of a joint working group meeting was that the revised specification for the concrete waste containers would be included in the waste acceptance criteria for Vaalputs.

BACKGROUND

In the field of regulation of natural sources, the NNR regulates mining and mineral processing facilities where there ia a potential radiological hazard. The central objective is to ensure adequacy of the radiological protection regime and regulatory arrangements established for the protection of persons, property and the environment against possible damage from ionising radiation generated in mining and minerals processing.

Following the promulgation of the NNR Act in 2002, authorised mining and minerals processing facilities were required to convert their nuclear licences to certificates of registration. The NNR adopted a two-phased approach in converting nuclear licences to certificates of registration. The first phase was to focus on conversion of mining and minerals processing facilities and scrap re-cyclers. Presently there are 70 of these holders authorised by the NNR and of these 41 have already converted from nuclear licence to certificate of registration. The second phase of issuing of 24 certificates of registration to users of small quantities of radioactive material is underway.

A further total of 22 new applications had been received for certificate of registration during the reporting period.

At the end of the reporting period, the number of mining and minerals processing facilities and users of small quantities of radioactive material authorised by the NNR was:

Holder in the category	Number
Mining and minerals processing facilities	60
Scrap re-cyclers	10
Small users of radioactive material	24
Total	**94**

Seventy-three authorisation change requests were approved during the reporting period. These involved procedures and programmes required in terms of authorisation conditions.

Discussion of the clean-up of the 38 contaminated sites continued between the NNR and the Chamber of Mines. The established Rehabilitation Coordinating Group (RCG) agreed that an independent consultant should be contracted to carry out the cleanup project. The project was then put on tender and awarded to ChemRad. Cleanup of sites is due to begin in June/July 2003 following submission and approval of cleanup procedures to the NNR.

The NNR/Industry working group on management of radioactively contaminated scrap completed its work during the reporting period and submitted a report with recommendations to the NNR. One fundamental recommendation was to establish a protocol relating to scrap matters. The development of such a protocol will be undertaken during 2003.

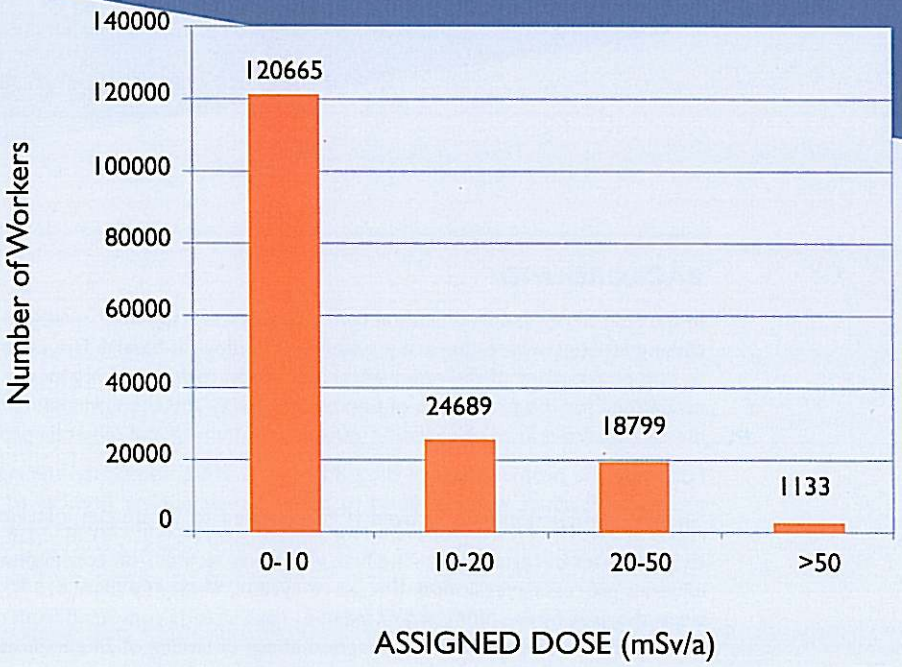
SAFETY ASSURANCE

1. OCCUPATIONAL EXPOSURE

The NNR assessment of the reporting adequacy regarding occupational exposure has resulted in an improved format.

The graph below represents a comparison of the distribution of doses reported by holders for the 2001 and 2002 annual dose reports. From the graph it is clear that the number of persons who potentially exceeded the dose limit was much lower in 2002 than in 2001. One of the factors that contributed to the improvement was the implementation of more rigorous compliance assurance measures by the NNR during 2002 at those mines where dose limits were exceeded. A working group has been established in order to develop a status report on the radiation hazards to members of the public arising from mining and minerals processing. Activities of the working group are ongoing.

Figure 6:



2. PUBLIC EXPOSURE

The NNR's approach in developing a status report on the radiation hazards arising from mining and minerals processing to members of the public was discussed during a stakeholder workshop in July 2002. The NNR proposed comprehensive strategies and felt that a working group including representatives of holders should be established to deal with all the issues pertaining to the development of such a status report. Activities of the working group are ongoing.

3. TRANSPORT SAFETY

Routine shipments of low specific activity (LSA-1) material happen daily between the authorized mines, scrap dealers and smelters and at least 12 000 shipments took place during the reporting period. No incidences of any significance were reported from any of these shipments.

4. INSPECTIONS AND AUDITS

Eleven holders of nuclear authorizations were audited during the reporting period. Various observations and findings were raised during these audits and holders were required to provide a plan of action to address the deviations.

160 inspections were conducted to verify the degree of compliance with the various programmes and procedures implemented by the holders. Holders were required to investigate the reasons for and implement corrective actions related to all the non-compliances identified.

INCIDENTS / OCCURRENCES

A total of 13 incidents / occurrences were reported by holders. Two were regarded as Class 1 where the projected occupational exposure exceeded the 50mSv dose limit for workers. The remainder were of less safety significance.

PROSPECTIVE LICENSING AND OTHER PROJECTS

PROPOSED PEBBLE BED MODULAR REACTOR

The proposed PBMR is a graphite moderated, helium cooled reactor using a direct gas cycle to convert the heat, generated by nuclear fission in the reactor (pebble bed reactor core type design) and transferred to the coolant gas, into electrical energy by means of a helium turbo-generator. By design, provision has been made to accommodate the storage of spent fuel in the buildings for the 40-year design life of the plant and thereafter for a further period if so required. Radioactive material and waste will be managed and disposed of in accordance with Regulatory and Government legal requirements. Should construction be approved it is proposed to locate the installation on Eskom property within the owner-controlled boundary of Koeberg Nuclear Power Station.

During the reporting period the NNR continued to review the nuclear installation licence application submitted by Eskom.

PROPOSED 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.

During the reporting period the NNR reviewed the following documents related to the proposed PBMR Fuel Plant:

- Site description;
- Fuel plant, facility and process overview,
- Requirements for the fresh fuel container, design, manufacture and certification, as well as
- Requirements for the fresh fuel transportation.

The NNR also commented on the following documents:

- Radiological and nuclear safety assessment methodology,
- Nuclear safety in the design of the fuel plant and
- Public Information Document, prepared as part of the preparation for the public hearing process.

The issuing of the nuclear licence for the proposed PBMR Fuel Plant will be subject to the finalisation of the NNR public hearing process and the NNR evaluation of the associated safety case.

PROPOSED PRODUCTION SMELTER AT NECSA

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 smelting as the most appropriate and cost-effective method to achieve this.

The issuing of the nuclear licence for the proposed smelter will be subject to the finalisation of the NNR public hearing process and the NNR evaluation of the associated safety case.

BOREHOLE DISPOSAL INVESTIGATION

The IAEA requested Necsa to undertake a Technical Cooperation (TC) investigation to demonstrate the feasibility of disposing of disused sealed radioactive sources (DSRS) in a borehole. The proposed completion date for this investigation is the end of December 2003.

Since the IAEA specified that the investigation be subjected to a regulatory process, Necsa requested the NNR to participate as a partner in the TC project. The NNR involvement in this borehole disposal investigation is in terms of Section 7(1)(i) of the National Nuclear Regulator Act.

The NNR reviewed the design basis and assessment context for the site-specific safe-

ty assessment for the borehole disposal investigation during the reporting period. The review of the use of a generic safety assessment in conducting the site-specific safety assessment is planned during the next reporting period.

NUCLEAR VESSEL LICENCE APPLICATION

In terms of section 21 of the NNR Act, the Naval and Air Adviser to the British High Commission in South Africa, on behalf of the British Royal Navy, made an application for a Nuclear Vessel Licence to enable the nuclear powered military vessel of the British Royal Navy, HMS Splendid, to visit the Naval Base of Simonstown during 17-22 July 2002.

Taking into account the military secrecy with surrounds divulging details regarding design and operational technical information and the sovereignty attached to military vessels, the NNR developed a procedure, taking into account the relevant requirements of sections 21 and 24 of the NNR Act, for the review of such application.

In accordance with the NNR Act, public comments were solicited in relation to the application. After reviewing the public representations the NNR Board directed the Chief Executive Officer to grant the nuclear vessel licence subject to the minister's direction. A Nuclear Vessel Licence –NVL 001 was issued to the applicant, the British High Commission, on 5 July 2002 for the visit of HMS Splendid to the Simon's Town naval base from 17-22 July 2002. The vessel docked in Simon's Town on 17 July and left on 22 July.

The NNR conducted independent radiological surveys in the vicinity of the military vessel, e.g water sampling and environmental radiation monitoring, prior, during and after the vessel's, visit. The results of the analyses of these water samples and radiation readings did not indicate any problems.

STANDARDS AND REGULATORY PRACTICES

BACKGROUND

In terms of section 36 of the NNR Act the NNR must make recomendations to the Minister of Minerals and Energy regarding safety standards and regulatory practices. These were finalised during the reporting period and based on international standards of the IAEA. To support its efforts on the development of standards and regulatory practices, the NNR is involved in various investigative projects and activities discussed below.

Background Radioactivity

A project that addresses the background radioactivity concentrations in soil, water and air in South Africa was initiated during the reporting period. The research report was provided to the NNR for technical review and approval. The associated database has been designed and its development completed.

IAEA Co-ordinated Research Projects (CRP)

CRPs are usually organized to investigate a particular area of concern with regard to regulations. It had been found in the 1996 edition of the transport regulations that requirements for the classification, packaging and transport of LSA/SCO did not all have a strong radiation protection basis. A project was initiated in 1998 with the title "Development of the Radiological Basis for the Transport Safety Requirements for Low Specific Activity Materials and Surface Contaminated Objects (LSA/SCO)".

In 1998 South Africa participated in the IAEA's Co-ordinated Research Project relating to the establishment of a radiological basis for the transport of low specific activity material and surface contaminated objects. An arbitrary factor had been used in the exemption clauses of the IAEA code on the safe transport of radioactive materials. Negotiations were under way with Richards Bay Minerals, and the NNR was able to recommend a research project, which was accepted by the IAEA. This project was entitled "Risk Assessment of the Bulk Transport of Zircon Sands". The purpose of this study was to determine the attendant radiological risks to transport workers and members of the public. The results of the study will be published.

In February 2003 the project was accepted by the IAEA to be formalised as a TECDOC.

ASAM

The IAEA launched a new coordinated research project, entitled "Application of Safety Assessment Methodologies for Near Surface Waste Disposal Facilities (ASAM)". The overall objective of ASAM is to investigate the practical application of safety assessment methodologies to a range of near-surface radioactive waste disposal facilities for low and intermediate level radioactive waste and to develop practical approaches to assist regulators, operators and other specialists reviewing the safety assessments. Staff members of the NNR attended the launch of the project in November 2002 and are actively involved in this project through their participation in a number of its working groups.

The project will assist the NNR in addressing various challenges that South Africa faces, namely:

- Review of the post-closure safety assessment of the Vaalputs National Radioactive Waste Disposal Facility
- The development of a review procedure and its implementation for borehole facilities for disused sealed sources
- The development of guidance for post-closure assessment for mining facilities
- The provision of advice to government on national policy issues.

It will also enhance the capacity building of NNR staff participating in the project.

LABORATORY

The NNR is mandated to ensure that public and workers' doses for all facilities are

within the ALARA principle and that compliance with the regulatory limits as set out by NNR standards are demonstrated. As an imported regulatory practice the NNR conducts a verification programme for authorized facilities, such as NECSA, Koeberg Nuclear Power Station and some gold mining activities. It is important that the NNR, as an independent regulatory body, conduct these verification analyses to ensure that the levels of radioactivity surrounding these sites are acceptable to human health, property and the environment.

The NNR has a laboratory for the routine verification analysis of samples from NECSA, Koeberg and some gold mines. The reported results from NECSA and Koeberg are compared to those of NNR laboratory for quality assurance purposes.

Independent routine sampling is also conducted on and around licensed facilities.

IAEA ACTIVITIES

NUCLEAR SAFETY STANDARDS COMMITTEE (NUSSC)

The IAEA establishes safety standards and measures that are issued in the IAEA's Safety Standard Series. The Nuclear Safety Standards Committee (NUSSC) is a body of senior regulatory officials with technical expertise in nuclear safety. NUSSC was established in 1996 and provides advice to the Director-General on the overall programme relating to regulatory aspects of nuclear safety and has as its primary role the development and revision of the Agency's nuclear safety standards.

The categories of safety standards series are Safety Fundamentals, Safety Requirements and Safety Guides. The Safety Fundamentals were used as the basis for the development of the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. Mr P. Bester attended the NUSSC meetings.

WASTE SAFETY STANDARDS COMMITTEE (WASSC)

The Waste Safety Standards Committee (WASSC) is a standing body of senior regulatory officials with technical expertise in radioactive waste safety.

WASSC provides advice to the IAEA Secretariat on the overall programme on regulatory aspects of radioactive waste safety and has the primary role in the development and revision of the IAEA's radioactive waste safety standards.

Mr T Parther attended two meetings of WASSC during the reporting period.

TRANSPORT SAFETY STANDARDS COMMITTEE (TRANSSC)

The IAEA's Transport Safety Standards Committee, TRANSSC is the top-level advisory group to the Director-General of the IAEA on all activities relating to the transport of radioactive material. This membership provides an opportunity for South Africa to contribute to the drafting and revising of transport regulations.

Regulations for the safe transport of radioactive material have served (since 1961) as the basis of safety for the transport of radioactive material worldwide. These regulations have been adopted in national regulations by most of the IAEA member states. The international regulatory bodies, having responsibility for the various modes of transport, have also implemented the IAEA regulations. The Regulations underwent several comprehensive revisions. During the current regulatory revision, which culminated in 1996, the IAEA advisory body for transport (TRANSSAC) decided to issue a guidance dealing with not only "what" is required for safe transport, but also "how" to comply with the updated regulatory requirements. Dr. K.K.Jutle attended two meetings during the reporting period.

RADIATION SAFETY STANDARDS COMMITTEE (RASSC)

The Radiation Safety Standards Committee is a standing body of senior regulatory officials that advises the IAEA on issues of radiation safety. The Directorate Radiation Control of the Department of Health is the representative of this committee. The NNR makes inputs and receives feedback on the dealings of this committee through the Directorate Radiation Control.

INTERNATIONAL OBLIGATIONS

Convention on Nuclear Safety

In terms of the NNR Act the NNR must fulfill national obligations in respect of international legal instruments concerning nuclear safety. South Africa is signatory to the Convention on Nuclear Safety.

South Africa submitted its Second National Report, which was presented at the second review meeting held in Vienna in April 2002. This report was compiled taking into account the general observations and conclusions made in the Report of the First Review Meeting of the Contracting Parties (held in 1999) and other relevant changes in the management of nuclear safety in South Africa.

South Africa and in particular the NNR strongly supports the Convention on Nuclear Safety and as a follow-up to the meeting, the NNR is undertaking a detailed review of the observations and conclusions made in the Report of the Second Review meeting, with the main objective of identifying any potential shortcomings within the South African context and to implement, where necessary, improvement measures.

Public participation in the PBMR licensing process

The NNR Act makes provision for public participation in the licensing process connected with the application. In terms of the PBMR licence application the NNR Board decided that, based on the public representations made to the NNR following the publication and serving of the Licence application in January 2001, public hearings would take place following a positive Record of Decision (ROD) from the Environmental Impact Assessment (EIA) being undertaken under the Environment Conservation Act.

Koeberg Emergency Planning Liaison Committee

The NNR monitors aspects relating to emergency planning through the Emergency Planning Liaison Committee (EPLC). The NNR hosts this meeting which meets three times a year and is attended by Eskom, the NNR, local municipalities and civil protection organizations. At this meeting matters relating to nuclear emergency planning, the technical basis of the emergency plan, organizational matters, infrastructure, training and the annual emergency exercise are discussed.

Koeberg Environment Development Committee - KEDC

The NNR monitors aspects relating to emergency planning and developments surrounding the Koeberg Nuclear Power Station which impact on the viability of the emergency plan through the Koeberg Environs Development Committee (KEDC). This committee, chaired by the NNR, meets on a bimonthly basis, and is attended by Eskom, representatives of local municipalities (now Cape Town Unicity), and Disaster Management. Issues relating to developments in the vicinity of Koeberg are discussed including:

- Urban developments in the Atlantis Growth Corridor
- The Blaauwberg Spatial Development Framework
- Demographics and infrastructure requirements imposed by the Koeberg emergency plan
- Applications for development rights.

During the reporting period the NNR has, through these committees, and in correspondence with local authorities, expressed the need for planned and ongoing developments to be assessed and to be shown to be in conformance with the Koeberg emergency plan. This will be further enhanced by regulations in terms of section 38(4) of the NNR Act as reported earlier in the report

• Meeting between the 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 reracking project
- Pebble Bed Modular Reactor
- Safety culture
- Outages.

Meetings were held with the Unions in March, July and November 2002. The main items of discussion were as follows:

- The way forward in terms of liaison between the NNR and the Atlantis community and public communication generally.
- Concerns regarding emergency planning such as provision of transport for the evacuation of plant personnel, the public address system at mustering points, and union representation as observers.
- Qualification of contracted staff.


Meeting with Unions

• Meeting with the Western Cape Provincial Cabinet

The NNR received an invitation for a meeting with the Executive Council of the Western Cape Province Cabinet, to discuss issues related to the Koeberg Nuclear Power Station. The meeting took place on 3 September 2002 at the Western Cape Provincial Cabinet Chamber in Cape Town. The meeting was chaired by the Western Cape Premier, Mr A. van Schalkwyk, and attended by 9 Ministers from the Cabinet. Six members of the NNR attended the meeting

The NNR was given the opportunity to make a presentation which basically introduced the role of the NNR in regulating nuclear installations, e.g Koeberg and also provided some insights on some of the issues to be discussed which broadly included co-operative agreement between the NNR and the Provincial Government of the Western Cape (PGWC) under section 6 of the NNRA, high level waste, spent fuel storage, developments around Koeberg (regulation in terms of section 38(4) of the Act) and additional safety measures at Koeberg. After constructive discussions following the NNR presentation, it was agreed to set in motion a process to conclude an appropriate agreement between the NNR and the PGWC.

• Atlantis Forum in the Western Cape

The NNR held a meeting with the Atlantis Community on 13 June 2002 in Atlantis in the Western Cape. Although attendance by the public was far better than the previous meeting held in 2001, the NNR needs to optimise its strategy in terms of the conduct of such meetings in order to gain maximum benefit for such interaction with the general public around Koeberg. Follow-up meetings are scheduled to take place.

INTERNATIONAL CO-OPERATION AND LIAISON

• Bilateral Meeting with the French Nuclear Regulator – DGSNR – September 2002

The NNR hosted this bilateral meeting with the French Nuclear Regulator which was held in September 2002 at the NNR Centurion offices. It was agreed that further technical cooperation would take place on a number of subjects.

• NNR participation in the FRAREG meeting

The NNR participated in the 3rd FRAREG meeting held at the offices of the Belgian nuclear regulator AVN in its Brussels offices in March 2003. Regulators of countries equipped with FRAMATOME design reactors, namely: Belgium, China, France, South Korea and South Africa, have decided to create the FRAREG Nuclear Regulators (FRAREG) Association Group. The prime objective of this group is to exchange information on the main events and safety issues which occurred in Framatome-designed nuclear power plants in the various countries represented at FRAREG.

ORGANISATIONAL STRUCTURE OF THE NNR

The NNR's organizational structure is constituted of the following core groups:

(a) Regulatory Strategy Development Division

(b) Nuclear Technology and Natural Sources Division

(c) Assessment Group

(d) Corporate Support Services Division

(e) Power Reactor Division

PERSONNEL STRUCTURE OF THE NNR

Staff Category

Chief Executive Officer	1
Senior Management	4
Programme or Departmental Management	9
Process /Functional Sub-group Coordination	9
Regulatory Officials and Specialists (all levels)	30
Administrative, Secretarial and Support staff	22

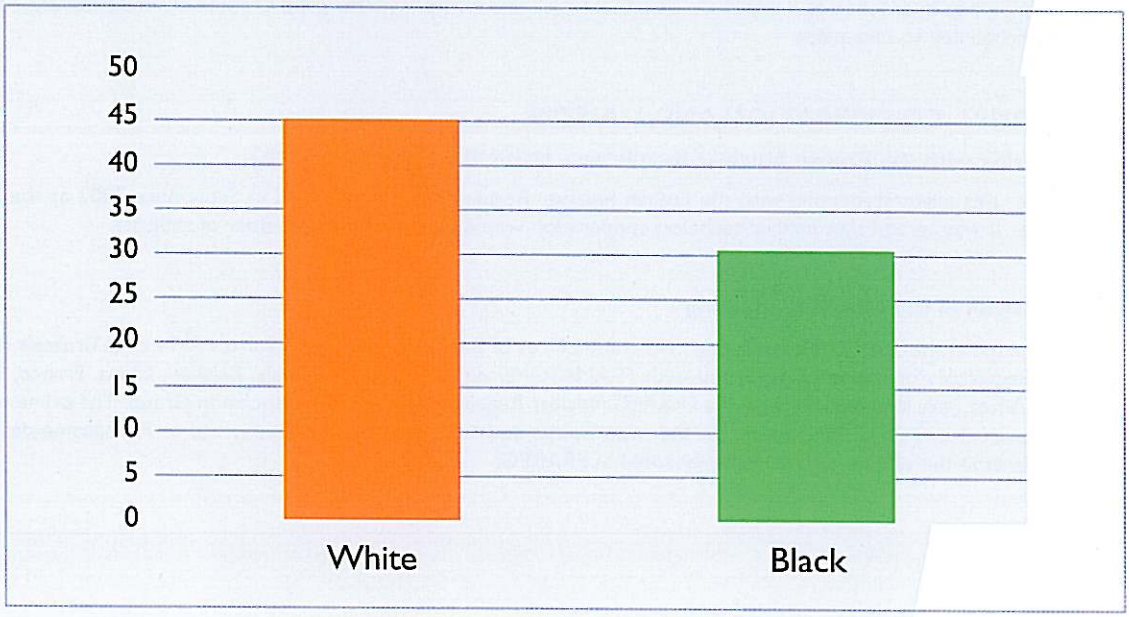
EMPLOYMENT EQUITY

Representativity - total staff

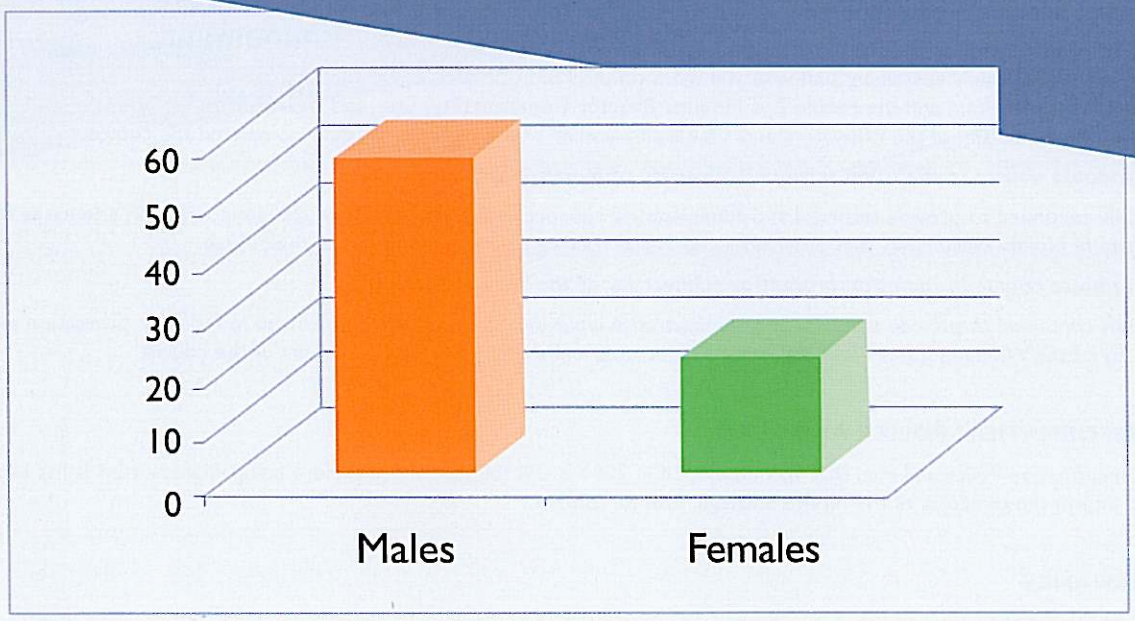
a) Total NNR composition

White males	33	(44%)
Black males	22	(29.33%)
White females	12	(16%)
Black females	8	(10.66%)
Disabled	3	(0.04%)

b) Composition of Staff by Race (Figure 7)



c) Composition of Staff by Gender (Figure 8)



d) Management

Top management

White males	3	(60%)
Black males	2	(33.33%)
White females	0	(0%)
Black females	1	(16.66%)
Disabled	1	(16.66%)

Senior Management

White males	4	(40%)
Black males	4	(40%)
White females	0	(0%)
Black females	2	(20%)
Disabled	2	(20%)

CAPACITY BUILDING

Staff Qualifcations

Qualifications	Number of staff
Doctorate	8
Masters	11
Honours	18
Baccalaureate	13
Diploma	15
Matric	15
Sub-matric	1

STAFF DEVELOPMENT

The NNR regards staff development in a very serious light and has allocated approximately 3.5% of its personnel budget to staff training and development. Priorities in allocating resources for training and development gave specific emphasis to the accelerated training of staff from the designated group.

Bursary scheme

The NNR provided bursaries to six students during the reporting period. All the bursaries were granted to students from the previously disadvantaged group. Bursaries were allocated as follows:

1) Mechanical engineer	(1 x University of Natal)
2) Civil engineer	(1 x University of Cape Town)
3) Electrical engineer	(1 x University of Durban-Westville)
4) Radiation Science	(2 x University of North West)

In addition, the NNR sponsored experiential learning opportunities for engineering students.

University involvement

Post-graduate course in nuclear safety

The NNR continued its support of the post-graduate course in nuclear safety at the University of the Witwatersrand. The course was aimed mainly at training staff who will work on the PBMR project. The course was developed and presented by the NNR, NECSA, Eskom and the Pebble Bed Modular Reactor Company (Pty) Ltd , and was facilitated by the Schönland Centre at the University of the Witwatersrand. One staff member of the NNR successfully completed the course.

Post-graduate course in radiation science (University of North-West)

The NNR continued to provide technical and administrative support to the post-graduate course in radiation science at the University of North-West. NNR staff provided lectures and training material in support of the course.

Post-graduate course in radiation protection (University of the Witwatersrand)

The NNR continued to provide technical and administrative input into the post-graduate course in radiation protection at the University of the Witwatersrand. NNR staff provided lectures and training material in support of the course.

TRANSFORMATION POLICY AND PLAN

The Transformation Policy and Plan that was developed in 2001 is still relevant and therefore being implemented. It has been used to inform the direction of the NNR's Strategic Plan for 2003/4.

GOVERNANCE

Board of Directors

The membership of the Board is detailed in the section labelled "People at the Helm"

Board subcommittees

The Board currently has two standing committees to deal with specific issues, namely:

(a) Audit Committee

The membership and functions of the Board's Audit Committee are detailed in the Directors' report.

(b) Transformation and Development Committee

This subcommittee of the Board deals with matters that relate to transformation, human resources, staff development and remuneration.

(c) Board Ad Hoc Committees

1. Emergency Planning
2. Finance Committee
3. Editorial Committee

The Transformation and Development committee comprises of the following:

Chairperson
Prof S H Taole

Members

Ms EK Mohammed
Mr R Lockwood
Dr S W P de Waal
Mr BC Winkler (passed away in April 2003)
Prof K Bharuth-Ram

The subcommittee met three times during the reporting period.

STATEMENT OF RESPONSIBILITY

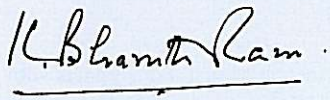
The Public Finance Management Act (Act 1 of 1999, as amended) requires the directors to ensure that the entity keeps full and proper records of its financial affairs. The annual financial statements fairly present the state of affairs of the National Nuclear Regulator, its financial results, its performance against predetermined objectives and its financial position at the end of the year in terms of Generally Accepted Accounting Practice.

The annual financial statements are the responsibility of the directors. The external auditors are responsible for independently auditing and reporting on the financial statements. The annual financial statements have been prepared in accordance with Statements of Generally Accepted Accounting Practice. These annual financial statements are based on appropriate accounting policies, supported by reasonable and prudent judgments and estimates.

The directors have reviewed the National Nuclear Regulator's budgets and cash flow forecasts for the year to 31 March 2003. In order to comply with the requirements of AC 116 (post-employment benefit costs) in terms of the Generally Accepted Accounting Practice (GAAP), the NNR is required to make provision for the medical benefits liability, in the prescribed manner. This has resulted in a situation where the liabilities technically exceed the assets. (See note 4 of the Financial Statements)

The directors have reviewed the entity's systems of internal control and risk management for the period from 1st April 2002 to 31 March 2003. The directors are of the opinion that the entity's systems of internal control and risk management were effective for the period under review.

The annual financial statements for the year ended 31 March 2003, set out on pages 36 to 38 and 48 to 60, were approved by the Accounting Authority in terms of section 51(1)(f) of the Public Finance Management Act (Act 1 of 1999, as amended), on 30 May 2003, and are signed on its behalf by:



K BHARUTH-RAM
Acting Chairperson



LB ZONDO
Chief Executive Officer

AUDITOR-GENERAL

REPORT OF THE AUDITOR-GENERAL TO PARLIAMENT ON THE FINANCIAL STATEMENTS OF THE NATIONAL NUCLEAR REGULATOR FOR THE YEAR ENDED 31 MARCH 2003

1. AUDIT ASSIGNMENT

The financial statements as set out on pages 36 to 38 and 48 to 60, for the year ended 31 March 2003, 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, based on the audit.

2. NATURE AND SCOPE

2.1 Audit of financial statements

The audit was conducted in accordance with Statements of South African Auditing Standards. Those standards require that I plan and perform the audit 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.

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.

3. AUDIT OPINION

In my opinion, the financial statements fairly present, in all material respects, the financial position of the National Nuclear Regulator at 31 March 2003 and the results of its operations and cash flows for the year then ended, in accordance with prescribed accounting practice and in the manner required by the Public Finance Management Act, 1999 (Act No 1 of 1999).

4. EMPHASIS OF MATTER

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

4.1 Going concern

As reported in the previous financial year and with reference to note 4 to the financial statements the Regulator's total liabilities exceed its total assets by R4 840 447 as at 31 March 2003 (2002 : R5 876 696).

5. APPRECIATION

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

S Petzer
for **Auditor-General**
Pretoria
31/07/2003

1 INTRODUCTION

The directors present their annual report that forms part of the audited annual financial statements of the organisation for the year ended 31 March 2003.

The National Nuclear Regulator is listed as a national public entity in schedule 3 part A of the Public Finance Management Act, (Act 1 of 1999, as amended) (PFMA). It was established in terms of Section 3 of the National Nuclear Regulator Act, (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 –
   i) the siting, design, construction, operation, manufacture of component parts, and the decontamination, decommissioning and closure of nuclear installations; and
   ii) 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 authorisations through the implementation of a system of compliance inspections; and
e) fulfil national obligations in respect of international legal instruments concerning nuclear safety; and
f) to ensure that provisions for nuclear emergency planning are in place

The Board of Directors acts as the accounting authority in terms of the PFMA.

2 BOARD OF DIRECTORS

NAME

Non-Executive Directors

Mr G Aboobaker
Prof K Bharuth-Ram (Acting Chairperson)
Dr S W P de Waal
Mr D Elbrecht
Mr RC Lockwood
Mr EB Mathebula
Ms EK Mohammed
Mr AHCH Motaung
Dr JM Stewart
Prof SH Taole
Mr BC Winkler

Executive Directors

Ms LB Zondo (Chief Executive Officer)

Changes in membership

- Mr BC Winkler passed away on 9 March 2003.
- Mr AHCH Motaung was appointed with effect from 15 November 2002
- Mr G Aboobaker and Ms T Zungu were appointed with effect from 22 August 2002

Alternate Directors

Mr W Fourie (alternate to Mr E B Mathebula) and Ms T Zungu (alternate to Dr S W P de Waal) are appointed from the Department of Environmental Affairs and Tourism and Department of Minerals and Energy, respectively.

3 ORGANISATIONAL STRUCTURE

The executive authority to whom the National Nuclear Regulator is accountable is the Minister of Minerals and Energy.

4 OPERATING RESULTS

The operating surplus of R1, 04 million for the year is mainly due to the actuarial valuation of post-retirement medical aid liability.

5 REVIEW OF OPERATIONS

The total income for the NNR is R45.32million (2002: R39,70 million) including the Government Grant of R7,28 million (2002:R7 million) and the operating costs amount to R44.28million (2002:R43,03million)

6 PRINCIPAL ACTIVITIES

The National Nuclear Regulator'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.

In discharging its mandate, the NNR continued to implement government policy regarding transformation. In this regard, the NNR has developed a transformation policy and plan. The implementation of the policy and plan forms the basis of the NNR's strategic plan, which will be implemented during the forthcoming financial year.

The NNR remained committed to capacity building initiatives, ensuring that people from the previously disadvantaged groups are given an opportunity to enter the nuclear industry. Public participation in the regulatory process continued to be a high priority and it is envisaged that more initiatives will be undertaken in the future to ensure that the public is informed about regulatory and safety-related matters, and that it is 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.

7 EVENTS SUBSEQUENT TO BALANCE SHEET DATE

The NNR directors are not aware of any matter or circumstance which may have arisen since the end of the financial year, not otherwise dealt with in the annual financial statements, which significantly affects the position of the organisation or the results of its operations

8 MATERIALITY AND SIGNIFICANT FRAMEWORK

The NNR had not complied with Treasury Regulation 28.2.1 issued in terms of the Public Finance Management Act (Act No 1 of 1999). Acting on advice that the NNR was not required to develop a materiality and significant framework, the NNR did not develop the framework but recorded in its Strategic Plan for the period 2002-2005 that the materiality figure set by the Auditor General was the materiality applicable to the NNR. The situation has subsequently been rectified and the Board has approved a materiality and significant framework, the Auditor-General has been consulted about it and agreement of the Minister has been requested.

9 STAKEHOLDER RELATIONS

Overall there was great improvement in relations with stakeholders. Specific improvements were due to the establishment of standing meetings/forums with various stakeholders which included the regulated entities (e.g Industry Forum on Radiation), policy decision makers (DME), and organised labour within some of the regulated entities. The NNR maintained relations with other strategic cooperatives, such as the media, NGO's, the general public, and international organisations and nuclear regulatory authorities in other countries.

10 SHAREHOLDER RELATIONS

The NNR reported to and discussed with the Executive authority significant events. The major events included the Greenpeace incursion into the Koeberg Nuclear Power Station on 24 August 2002. The definition of the NECSA site and implications for various types of operations on the site was discussed and consideration of that matter continues. In light of the impending National Radioactive Waste Management Policy and Strategy, the NNR requested guidance from the DME on the approach to authorisation for NECSA to receive small quantities of waste from external generators. In addition, there has been interaction with the Executive authority on the exercise of regulatory control at some special case mines.

11 SOCIAL RESPONSIBILITY

The organisation focussed its social responsibility by using its technical capabilities to empower students in the area of nuclear sciences. This was done both at university and at high school level. Staff members of the organisation took up mentoring responsibilities to empower the scientists of tomorrow. The expenditure on these social endeavours was in the region of R140 000 (One hundred and forty thousand rands). The objective is to promote the entry of young South Africans into careers in science and especially in nuclear sciences and thus enhance the skills-base of the country in these fields.

12 ADDRESSES

The business addresses of the National Nuclear Regulator are as follows:

Physical address: Second Floor, Block A
Old Mutual Centre
Embankment Road
Centurion
0046

Postal address: PO Box 7106
Centurion
0046

Telephone: (012) 674 7100
Fascimile: (012) 663 5513
Email: nnr@nnr.co.za

REPORT ON PERFORMANCE AGAINST OBJECTIVES

The assessment of NNR business performance against objectives is contained in the tables below:

A. CORE BUSINESS

OBJECTIVES	KEY PERFORMANCE INDICATOR	TARGET	ACTUAL	PERFORMANCE RESULTS	NOTES
1. To review and authorise (or otherwise) new actions and to review and approve (or otherwise) changes to existing actions	A plan for each programme	Yes	Yes	Achieved	Each programme has a detailed operational plan which includes the review and authorisation of new actions as well as changes to existing actions
	Public dose	RENS Limit of 250mSv/a	Not yet determined		The performance results for mines are not available as the Working Group on Public Hazard Assessments is yet to conclude its work. The project has been carried forward to 2003/2004 financial
		NECSA Limit of 250mSv/a NNR ALARA target of <50µSv/a	21 mSv/a	Achieved	
		Vaalputs Limit of 250mSv/a NNR ALARA target of <5µSv/a	0mSv/a	Achieved	
		KNPS Limit of 250mSv/a NNR ALARA Target of less than 2µSv/a	0.54 µSv/a	Achieved	
	Worker dose	RENS Maximum individual dose Limit 50mSv/a Average individual Dose NNR ALARA target <5mSv/a	61.4 mSv/a (assigned dose) 4.71 mSv/a	99.27%compliance with annual individual dose limit was achieved ALARA target average individual dose achieved	Although there is considerable improvement in the maximum dose values reported, the RENS target has not yet been achieved at some special case mines that have high levels of radon progeny. The total number of workers receiving doses in excess of the dose limit was 1 211.

OBJECTIVES	KEY PERFORMANCE INDICATOR	TARGET	ACTUAL	PERFORMANCE RESULTS	NOTES
		NECSA Maximum individual dose Limit 50mSv/a		Maximum individual dose limit achieved	Due to an incident in September (occurrence 927) the NTWP goal was not achieved for 1 worker.
		NNR ALARA limit on Maximum individual dose 20mSv/a	35.28 mSv/a	99.99% compliance with ALARA target was achieved	
		Average individual Dose NNR ALARA Target <5mSv/a	0.51 mSv/a	ALARA target on average individual dose achieved	
		Vaalputs Maximum individual dose Limit 50mSv/a		Maximum individual dose limit and ALARA targets achieved	
		NNR ALARA limit on Maximum individual dose <20 mSv/a	mSv/a		
		Average individual Dose NNR ALARA Target <5mSv/a	0.49 mSv/a		
		KNPS Maximum individual dose limit 50 mSv/a	15.07 mSv/a	Maximum individual limit achieved	
		Average individual dose NNR ALARA Target <5mSv/a	0.75mSv/a	Achieved	
	Public risk	Av = 10^{-8}/a Max= 5 x 10^{-6}/a	KNPS - 2 x 10^{-9} 3 x 10^{-6}	Achieved	This performance factor was only applicable to Koeberg Programme
	Worker risk	Av = 10^{-5}/a Max=5 x 10^{-5} /a	KNPS - Av=2 x 10^{-6} Max=3 x 10^{-5}	Achieved	This performance factor was only applicable to Koeberg Programme
	Response time to authorisation submissions	RENS Average of <90 days	63 days	Achieved	
		NTWP Average of <90 days	84 days	Achieved	
		KNPS Average of <90 Days	20 days	Achieved	
		PBMR : Average of <90 days PBMR SAR – 1 year	80 days 0.9 years	Achieved Achieved	

OBJECTIVES	KEY PERFORMANCE INDICATOR	TARGET	ACTUAL	PERFORMANCE RESULTS	NOTES
	Response time reliability	80%	PRD 100%	Achieved	All submissions received by PRD were responded within the timescales
			NTWP 81%	Achieved	
			RENS 27%	Not Achieved	Issuing of RENS COR's took a considerable time and adversely affected this measure
	Quality of NNR responses to authorisation submissions	80%	PRD – 100%	Achieved	The significance of technical comments in NNR reports and responses has been acknowledged by holders or applicants
			NTWP – 88%	Achieved	This measure is based on a determination of NECSA's satisfaction with NNR responses.
2. To regulate the reduction and optimisation of public and workers doses for all facilities within the ALARA principle	Public and worker doses	Same as objective 1 above	Same as objective 1 above	Same as objective 1 above	
	Cleanup of contaminated sites identified	3 contaminated sites	0 contaminated sites	Not achieved	There were considerable delays, but a tender has been awarded. The Chamber of Mines has made additional funds available to ensure that all sites are cleaned-up. The clean-up is due to commence in June-July 2003 following of approval of clean-up and rehabilitation procedures by the NNR.
	Dose quantified for all facilities through - safety assessment - dose reduction strategies developed	Yes	Ongoing	Ongoing	Ditto
	Holistic compliance assurance programmes	Yes	Ongoing	Ongoing	Ditto
3. To regulate with the view to mitigate the consequences of potential nuclear accidents	Public and worker risk	Same as objective 1 above	Same as objective 1 above	Same as objective 1 above	
	Compliance index	More than 80%	KNPS – 90%	Achieved	The NNR was able to identify the high

OBJECTIVES	KEY PERFORMANCE INDICATOR	TARGET	ACTUAL	PERFORMANCE RESULTS	NOTES
			RENS – 67% NTWP – 97% PBMR –N/A	Not achieved Achieved	percentage of non-compliance (i.e. compliance index of 67%) due to more effective and efficient inspections being conducted during the past financial year. 10% of the non-compliances were of safety significance related to potentially exceeding the annual dose limit, reducing exposure above the dose limit and recording of actual exposures.
	A plan to review adequacy of emergency preparedness arrangements around nuclear installations	Yes	Yes	Achieved	Emergency plans are in place and tested on a regular basis
4. To ensure a holistic compliance assurance approach including safety culture enhancement	Compliance index (Reduction in human error)	80%	80% and above	Achieved	
5. To conduct regulatory research and development	Objective from Strategic plan	100% of objectives;	Ongoing 80% of objectives	Ongoing	Report for the project relating to Radon was approved. The project on Natural Background is being reviewed The stakeholder satisfaction survey is not yet completed and therefore the performance results are based on the objectives achieved

B. STAKEHOLDER SATISFACTION

OBJECTIVES	KEY PERFORMANCE INDICATOR	TARGET	ACTUAL	PERFORMANCE RESULTS	NOTES
6. To improve stakeholder consultation	Stakeholder satisfaction	To be monitored as part of the stakeholder satisfaction index resulting in satisfaction index increasing to 68	Ongoing 60% of planned operational objectives	Ongoing	NNR Act enables public participation and other mechanisms to increase public participation and involvement of stakeholders in the NNR licensing process. Stakeholders provided input to the development of the terms of reference for the NNR public participation process. This advanced the NNR

OBJECTIVES	KEY PERFORMANCE INDICATOR	TARGET	ACTUAL	PERFORMANCE RESULTS	NOTES
					outreach initiatives and enhanced public consultation. Progress has been made to conclude cooperative governance agreements with organs of state identified in the relevant regulation. The framework for agreements was approved. Drafting teams were established and functioned effectively. Drafts have been concluded with some organs of state. The challenges in concluding most agreements are mainly because counterparts did not have the same plan on their schedules.
7. To make social investments	Stakeholder satisfaction	To be monitored as part of the stakeholder satisfaction index resulting in satisfaction index increasing to 68 from a baseline of 53.	Ongoing 90% of planned operational objectives	Ongoing	The stakeholder satisfaction survey has not been completed to enable an indication of achievement using the index, but the achievement is reported according to relevant objectives that were completed.
8. To implement preferential procurement	Stakeholder satisfaction (Increased spending of BEE's.)	To be monitored as part of the stakeholder satisfaction index resulting in satisfaction index increasing to 68 from a baseline of 53.	Ongoing	Ongoing	BEE is a prerequisite for NNR procurements that is implemented in practice. The NNR is in the process of establishing more quantitative targets.

C. INTERNAL BUSINESS PROCESSES

OBJECTIVES	KEY PERFORMANCE INDICATOR	TARGET	ACTUAL	PERFORMANCE RESULTS	NOTES
9. To improve business management practices	Stakeholder satisfaction	Monitored as part of the stakeholder satisfaction index resulting in satisfaction index increasing to 68	Ongoing 85% of planned operational objectives	Ongoing	Operational plans were finalised and they form the NNR's integrated plan . Work for the development of an appropriate quality management system is ongoing . An NNR work-flow and process analysis is completed. This will be followed by the design of appropriate processes and the alignment of the NNR IT system to the processes . The NNR has initiated discussions with the DME on an appropriate peer review process. The stakeholder satisfaction survey has not been completed to enable an indication of achievement using the index.
	Review existing information service infrastructure with the view to modernizing it, including upgrading of digital printers, fax machines and copiers	100%	20% Ongoing	Ongoing	A plan has been developed . The NNR acquired the services of a Manager responsible for the information service infrastructure in October 2002.

OBJECTIVES	KEY PERFORMANCE INDICATOR	TARGET	ACTUAL	PERFORMANCE RESULTS	NOTES
10. To enter into institutional agreements	Stakeholder satisfaction index	By 24 November 2002	Ongoing 40% of planned operational objectives	Not achieved	Progress has been made to conclude cooperative governance agreements with organs of state identified in the relevant regulation. The framework for the agreements was approved . Drafting teams were established and functioned effectively. Drafts have been concluded with some organs of state. The challenges in concluding most agreements arose mainly because counterparts did not have the same plan on their schedules. As a result significant delays were experienced in securing participation in the drafting process and approvals from principals.
11. To monitor the implementation of the NNR transformation policy and plan	NNR transformation policy and plan implemented	100%	60% of planned operational objectives	Ongoing	A report on the implementation of the employment equity aspect of the plan is finalised and the plan is being revised.

D. HUMAN RESOURCES

OBJECTIVES	KEY PERFORMANCE INDICATOR	TARGET	ACTUAL	PERFORMANCE RESULTS	NOTES
12. To realign human and financial management style, policies and procedures with SA legislation and objectives	Stakeholder satisfaction (Employee satisfaction component)	Monitored as part of the stakeholder satisfaction index resulting in satisfaction index increasing to 68 from a baseline of 53	Survey results not available 40% of planned operational objectives	Not available	
13. Accelerate organisational capacity building	Skills coverage ratio	Continuous improvement to above 80%	The current skills coverage is 60%.	Ongoing	Results on skills gap analysis as identified for the regulatory functions is used to guide further training needs. Mentoring and structured programmes are put in place to address the current skills gap.
	Employment equity	50:50 B/W in Top Management 58:42 B/W Senior	60:40 B/W in Top Management 67:33 B/W Senior	Achieved Achieved	Significant improvements have been made towards achieving employment equity as reflected in the Annual Report.

OBJECTIVES	KEY PERFORMANCE INDICATOR	TARGET	ACTUAL	PERFORMANCE RESULTS	NOTES
		Management 45:55 B/W Professional 36:64 B/W Techn/Qualified Admin	Management 34:66 B/W Prof 36:64 B/W Tec/Qual Admin	Not Achieved Achieved	
	Recovery of skills levy	Yes	Ongoing	Ongoing Response of PSETA awaited	A workplace Skills Plan and grant claims were submitted to the PSETA

REPORT OF THE AUDIT COMMITTEE FOR THE YEAR ENDED 31 MARCH 2003

The Audit Committee has adopted appropriate formal terms of reference, which have been confirmed by the Board, and has satisfied its responsibilities as set out in the terms of reference.

In performing its responsibilities the Audit Committee has reviewed the following:

- the effectiveness of the internal control systems;
- the effectiveness of internal audit;
- the risk areas of the entity's operations to be covered in the scope of internal and external audits;
- the adequacy, reliability and accuracy of financial information provided to management;
- the accounting or auditing concerns identified as a result of the internal or external audits;
- the activities of the internal audit function, including its annual work programme, co-ordination with the external auditors, the reports of significant investigations and the responses of management to specific recommendations;
- the adequacy of the terms of reference of the audit committee as well as other Board Committees;
- the scope and results of the external audit, and its cost effectiveness.

The Audit Committee has also been responsible for:

- overseeing the process for appointing the accounting firm responsible for providing the internal audit function;
- approving the internal audit work plan;
- ensuring adequate segregation between non-audit services and the internal audit function, where these services were provided by the same accounting firm;
- conducting investigations to confirm the reliability of management controls and reporting systems, ensuring appropriate corrective action where necessary.

The Audit Committee is satisfied that internal controls and systems have been put in place and that, following improvement in the procedures for communication between management and the Board, these controls have functioned effectively during the period under review. The Audit Committee considers the organisation's internal controls and systems appropriate in all material respects to:

- reduce the organisation's risks to an acceptable level;
- meet the business objectives of the organisation;
- ensure the organisation's assets are adequately safeguarded;
- ensure that the transactions undertaken are recorded in the organisation's records.

The Audit Committee has evaluated the annual financial statements of the National Nuclear Regulator for the year ended 31 March 2003 and concluded that they comply, in all material respects, to the requirements of the Public Finance Management Act (Act 1 of 1999, as amended). However the audit committee wishes to note that the basis for reflecting the organisation's liability for retired staff medical aid benefits requires further investigation. (See note 4 of the Financial Statements)



J M STEWART
Chairperson

Audit Committee members:
Dr JM Stewart (Chairperson)
Mr EB Mathebula
Ms T Zungu
Mr J Bone

Balance Sheet as at 31 March 2003

	Notes	2003 R	2002 R
Assets			
Non-current assets			
Property and equipment	2	**2,252,831**	2,476,132
Retirement benefit asset	4	**624,000**	-
Current assets		**16,521,566**	12,612,791
Trade and other receivables	3	**7,049,531**	5,058,172
Cash and cash equivalents	11.2	**9,472,035**	7,554,619
		19,398,397	15,088,923
Equity and liabilities			
Capital and reserves			
Accumulated deficit		**(4,840,447)**	(5,876,696)
Non-current liabilities			
Retirement medical benefits	4	**20,947,000**	17,667,343
Current liabilities		**3,291,844**	3,298,276
Trade and other payables		**1,180,030**	1,001,900
Provisions	5	**2,111,814**	2,296,376
		19,398,397	15,088,923

Income Statement for the year ended 31 March 2003

	Notes	2003 R	2002 R
Operating income	6.1	**44,553,545**	38,560,696
Operating expenses		**(44,281,401)**	(42,355,478)
Operating surplus / (deficit)		**272,144**	(3,794,782)
Interest received		**764,105**	465,889
Net surplus / (deficit)		**1,036,249**	(3,328,893)

Statement of Changes in Equity for the year ended 31 March 2003

	Accumulated deficit
	R
Balance at 31 March 2001	(2,547,803)
Deficit for the period	(3,328,893)
Balance at 31 March 2002	**(5,876,696)**
Surplus for the period	**1,036,249**
Balance at 31 March 2003	**(4,840,447)**

Cash Flow Statement for the year ended 31 March 2003

	Notes	2003 R	2002 R
Cash flow from operating activities		**2,830,788**	**1,866,977**
Cash receipts from authorisation holders and applicants		42,352,328	39,995,065
Cash paid to suppliers and employees		(40,285,645)	(38,593,977)
Cash generated from operations	11.1	**2,066,683**	**1,401,088**
Interest received		764,105	465,889
Cash flow from investing activities		**(913,372)**	**(1,691,170)**
Acquisition of equipment		(913,372)	(1,691,170)
Net increase in cash and cash equivalents		**1,917,416**	**175,807**
Cash and cash equivalents at beginning of the period		7,554,619	7,378,812
Cash and cash equivalents at end of the period	11.2	**9,472,035**	**7,554,619**

1 Accounting policy

The annual financial statements have been prepared in accordance with South African Statements of Generally Accepted Accounting Practice. The following are the principle accounting policies of the National Nuclear Regulator which are consistent in all material respect with those applied in the previous year, except as otherwise indicated.

1.1 Basis of preparation

The financial statements have been prepared on the historical cost basis.

1.2 Revenue recognition

Revenue is recognised when it is probable that future economic benefits will flow to the enterprise and these benefits can be measured reliably.

Revenue comprises of authorisation fees and other special projects. Revenue is recognised on the accrual basis.

Revenue arising from authorisation fees is recognised on an accrual basis in accordance with the substance of the relevant agreements.

1.3 Irregular, fruitless and wasteful expenditure

Irregular expenditure means expenditure incurred in contravention of or not in accordance with a requirement of any applicable legislation, including the PFMA.

Fruitless and wasteful expenditure means expenditure that was made in vain and would have been avoided had reasonable care been exercised.

All irregular, and fruitless and wasteful expenditure is charged against income in the period in which it is incurred. No irregular and fruitless and wasteful expenditure was recognized in this financial year.

1.4 Retirement benefit cost

The NNR operates a defined benefit plan in respect of post-retirement medical aid contributions as well as in respect of the pension fund. For the defined benefit plans, the defined benefit obligation and the related current service cost is determined by using the projected unit credit method. The defined benefit plans are subject to an annual actuarial valuation.

A portion of the actuarial gains and losses to be recognised as income or expense, provided the net cumulative actuarial gains and losses at the end of previous reporting period exceeds the greater of:

- 10% of the present value of the defined benefit obligation at that date, or
- 10% of the fair value of any plan assets at that date.

The portion of actuarial gains and losses is to be recognised, is equal to the excess calculated using the above limits, divided by the expected average remaining working lives of the employees participating in the plan.

Payments to the defined benefit plans are charged to the income statement in the year to which they relate.

1.5 Foreign currencies

Transactions in foreign currencies are accounted for at the rates of exchange ruling on the date of the transactions. Gains and losses arising from the settlement of such transactions are recognised in the income statement.

1.6 Property and equipment

Property and equipment are stated at historical cost less depreciation. Depreciation is calculated on the straight-line method to write off the cost of each asset over its estimated useful life to residual value as follows:

Property - land	Not depreciated
Property - buildings	20 years
Office furniture	10 years
Office equipment	5 years
Computer equipment	3 years
Scientific and technical equipment	5 years
Computer software	3 years

Accounting policy (continued)

1.7 Leasing

Leases under which the risks and benefits of ownership are effectively retained by the lessor are classified as operating leases. Obligations incurred under operating leases are charged to the income statement in equal instalments over the period of lease.

1.8 Financial instruments

Trade and other receivables

Trade and other receivables are stated at their nominal value as reduced by appropriate allowances for estimated irrecoverable amounts.

Trade and other payables

Trade and other payables are stated at their nominal value.

Cash and cash equivalents

Cash and cash equivalents are stated at their carrying amounts.

The directors consider that the carrying amount of the trade and other receivables, trade and other payables and cash and cash equivalents approximates their fair value.

1.9 Provisions

Provisions are recognised when the entity has a present legal or constructive obligation resulting from past events, for which it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation and a reliable estimate of the amount of the obligation can be made.

1.10 Interest received

Interest is recognised on a time proportionate basis with reference to the principal amount receivable and the effective interest rate applicable.

1.11 Comparative figures

Where necessary, comparative figures have been adjusted to conform with changes in the presentation in the current year.

	2003			2002		
	R	R	R	R	R	R
2 Property and equipment						
	Cost	Accumulated Depreciation	Book value	Cost	Accumulated Depreciation	Book value
2.1 Carrying amount as at the beginning of year	**8,911,807**	**(6,435,675)**	**2,476,132**	**9,897,678**	**(7,824,106)**	**2,073,572**
Furniture	548,508	(288,226)	260,282	543,660	(261,055)	282,605
Office equipment	594,432	(336,376)	258,056	701,107	(456,928)	244,179
Computer equipment	4,381,217	(3,466,464)	914,753	5,886,118	(4,987,221)	898,897
Scientific and technical equipment	2,241,208	(2,093,712)	147,496	2,339,293	(2,086,838)	252,455
Computer software	718,942	(208,145)	510,797	-	-	-
Property - Buildings	213,750	(42,752)	170,998	213,750	(32,064)	181,686
Property - Land	213,750	-	213,750	213,750	-	213,750
2.2 Additions	**913,372**	**-**	**913,372**	**1,691,170**	**-**	**1,691,170**
Furniture	78,797	-	78,797	36,084	-	36,084
Office equipment	96,076	-	96,076	106,193	-	106,193
Computer equipment	496,492	-	496,492	829,951	-	829,951
Scientific and technical equipment	-	-	-	-	-	-
Computer software	242,007	-	242,007	718,942	-	718,942
Property - Buildings	-	-	-	-	-	-
Property - Land	-	-	-	-	-	-
2.3 Disposals / adjustments	**(835,294)**	**831,974**	**(3,320)**	**(2,677,041)**	**2,592,441**	**(84,600)**
Furniture	2	(2)	-	(31,235)	20,509	(10,727)
Office equipment	(17,412)	17,412	-	(212,868)	207,810	(5,058)
Computer equipment	(835,296)	831,976	(3,320)	(2,334,852)	2,295,389	(39,463)
Scientific and technical equipment	17,412	(17,412)	-	(98,085)	68,733	(29,352)
Computer software	-	-	-	-	-	-
Property - Buildings	-	-	-	-	-	-
Property - Land	-	-	-	-	-	-
2.4 Depreciation	**-**	**(1,133,353)**	**(1,133,353)**	**-**	**(1,204,010)**	**(1,204,010)**
Furniture	-	(49,032)	(49,032)	-	(47,680)	(47,680)
Office equipment	-	(93,507)	(93,507)	-	(87,258)	(87,258)
Computer equipment	-	(634,790)	(634,790)	-	(774,632)	(774,632)
Scientific and technical equipment	-	(50,968)	(50,968)	-	(75,607)	(75,607)
Computer software	-	(294,378)	(294,378)	-	(208,145)	(208,145)
Property - Buildings	-	(10,678)	(10,678)	-	(10,688)	(10,688)
Property - Land	-	-	-	-	-	-
2.5 Carrying amount as at the end of year	**8,989,885**	**(6,737,054)**	**2,252,831**	**8,911,807**	**(6,435,675)**	**2,476,132**
Furniture	627,307	(337,260)	290,047	548,508	(288,226)	260,282
Office equipment	673,096	(412,471)	260,625	594,432	(336,376)	258,056
Computer equipment	4,042,413	(3,269,278)	773,135	4,381,217	(3,466,464)	914,753
Scientific and technical equipment	2,258,620	(2,162,092)	96,528	2,241,208	(2,093,712)	147,496
Computer software	960,949	(502,523)	458,426	718,942	(208,145)	510,797
Property - Buildings	213,750	(53,430)	160,320	213,750	(42,752)	170,998
Property - Land	213,750	-	213,750	213,750	-	213,750

The property (land and building) consists of an office block situated on erf 3187 Melkbosch Strand in the Blaauberg Municipality, Cape Division, Western Cape Province.

	2003	2002
	R	R
3 Trade and other receivables		
Trade receivables	**7,386,853**	5,211,201
Less: Provision for doubtful debts	**(549,351)**	(339,493)
Net trade receivables	**6,837,502**	4,871,708
Other receivables	**212,029**	186,464
	7,049,531	5,058,172

4 Retirement benefits

Post-retirement medical benefits

The NNR has made provision for a medical aid scheme covering employees who were in its employ on or before 1 July 1990 and who retire from its service. The NNR has also made provision to cover 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.

Post-retirement pension benefit

The NNR has made provision for a pension scheme covering all its permanent employees. The funds are governed by the Pension Funds Act, 1956 as amended.

The defined benefit schemes are valued actuarially at an interval of not more than 3 years using the projected unit credit method. The schemes were last actuarially valued during March 2003. In arriving at his conclusion, the actuary took into account the following assumptions at balance sheet date (expressed as weighted averages):

	Defined benefit pension plan		Post-employment medical benefit	
	2003	2002	**2003**	2002
Discount rate at 31 March 2003	**10.00%**	-	**9.00%**	11.70%
Expected return on plan assets at 31 March 2003	**12.00%**	-	-	-
Annual increase in health care costs	**8.00%**	-	**8.20%**	10.70%

4 Retirement benefits (continued)

The amount included in the balance sheet arising from the NNR obligation in respect of the contributions to staff members is as follows:

	Defined benefit pension plan		Post-employment medical benefit	
	2003 R	2002 R	2003 R	2002 R
Amounts recognised in the balance sheet				
Present value of obligations	**27,307,000**	-	**20,947,000**	20,500,000
Fair value of plan assets	**(24,060,000)**	-	**-**	-
Present value of obligations	**3,247,000**	-	**20,947,000**	20,500,000
Unrecognised actuarial (losses) gains	**(3,871,000)**	-	**-**	-
Unrecognised past service cost	**-**	-	**-**	(2,832,657)
Net liability in balance sheet	**(624,000)**	-	**20,947,000**	17,667,343
Movements in the net liability recognised in the balance sheet are as follows				
Net liability at beginning of the year	**-**	-	**17,667,343**	14,253,000
Change in accounting estimate	**-**	-	**916,657**	-
Net liability at beginning of the year	**-**	-	**18,584,000**	14,253,000
Net expense recognised in the income statement	**2,392,000**	-	**2,939,548**	3,888,343
Contributions	**(3,016,000)**	-	**(576,548)**	(474,000)
Net liability/(asset) at end of the year	**(624,000)**	-	**20,947,000**	17,667,343

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 exceed 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 retired 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.

			2003 R	2002 R
5	**Provisions**			
5.1	**Movements in provision for leave pay**			
	Opening balance		**1,854,357**	1,725,673
	Utilisation of provision		**(576,915)**	(367,415)
	Additional provisions		**366,403**	496,099
	Closing balance		**1,643,845**	1,854,357
5.2	**Movements in provision for annual bonus**			
	Opening balance		**442,019**	407,250
	Utilisation of provision		**(1,404,258)**	(1,255,646)
	Additional provisions		**1,430,208**	1,290,415
	Closing balance		**467,969**	442,019
6	**Operating surplus**			
	Operating surplus is stated after taking into account the following:			
6.1	**Operating income**			
6.1.1	Revenue		**36,963,224**	31,558,696
	Authorisation fees		**36,814,742**	30,129,394
	Other		**148,482**	1,429,302
	State contributions	**10**	**7,282,000**	7,002,000
6.1.2	Foreign exchange gain		**308,321**	-
	Total operating income		**44,553,545**	38,560,696

			2003 R	2002 R
6 Operating surplus (continued)				
6.2	**Expenditure**			
6.2.1	**Auditors remuneration**		**157,885**	26,696
	Auditors fees			
	- current year		**52,805**	26,696
	- prior year		**104,362**	-
	Auditors expenses		**718**	-
6.2.2	**Depreciation**		**1,133,353**	1,204,010
	Office furniture		**49,032**	47,680
	Office equipment		**93,507**	87,258
	Computer equipment		**634,790**	774,632
	Scientific and technical equipment		**50,968**	75,607
	Computer software		**294,378**	208,145
	Property - buildings		**10,678**	10,688
6.2.3	**Fees for services**		**2,063,694**	2,043,967
	Technical services		**1,150,651**	1,105,462
	Administration services		**864,124**	765,561
	Internal audit and services		**48,919**	172,944
6.2.4	**Directors' emoluments**	8	**201,403**	138,756
	Service fee		**174,397**	138,756
	Expenses		**27,006**	-
6.2.5	**Staff costs**		**31,115,453**	28,743,459
	Salaries, allowances and annual payments		**27,443,810**	24,692,265
	Included in staff costs are:			
	Defined benefit plan expenses		**5,333,000**	3,887,740
	- current service cost		**2,894,000**	700,000
	- interest cost		**3,953,000**	1,740,000
	- return on assets		**(1,888,000)**	-
	- past service cost - non-vested benefits		**-**	314,740
	- actuarial loss recognised		**374,000**	1,133,000
	Post-retirement medical benefit		**3,856,204**	3,887,740
	Post-retirement medical benefit		**2,939,548**	3,887,740
	Change in accounting estimate		**916,656**	-
	Taxation		**-**	-
	(Being change in past services cost, non-vested benefits)			
6.2.6	**Operating leases**		**1,453,206**	1,928,834
	Office building		**1,084,201**	1,614,976
	Equipment		**294,142**	231,160
	Vehicles		**74,863**	82,698
6.2.7	**Loss on scrapping of assets**		**3,320**	84,600
6.2.8	**Bursaries**		**417,768**	350,074
6.2.9	**Other operating costs**		**7,735,319**	7,835,082

	2003	2002
	R	R

7 Special Project

In terms of section 5(b)(i) of the NNR Act, (Act No 47 of 1999) the Regulator should exercise regulatory control related to safety over the siting, design, construction, operation, manufacture of component parts, and decontamination, decommissioning and closure of nuclear installations. In compliance with the aforegoing during the financial year the NNR entered into an agreement with Eskom for the Pebble Bed Modular Reactor project. The full income and expenditure for the project has been:

Income	**9,938,966**	673,800
Expenditure		
(Foreign consultants)	**9,938,965**	673,800

8 Directors' emoluments

For the year ended 31 March 2003	Salaries/ fees R	Bonuses R	Pension contribu-tions R	Other contribu-tions R	Total R
Non-Executive Directors					
Prof K Bharuth-Ram	42,577	-	-	-	42,577
Mr JLWC Bone	2,500	-	-	-	2,500
Dr S W P de Waal	-	-	-	-	-
Mr D Elbrecht	11,116	-	-	-	11,116
Mr W Fourie	-	-	-	-	-
Mr R C Lockwood	48,396	-	-	-	48,396
Mr E B Mathebula	-	-	-	-	-
Ms E K Mohamed	5,513	-	-	-	5,513
Dr J M Stewart	30,835	-	-	-	30,835
Prof S H Taole	24,541	-	-	-	24,541
Mr B C Winkler	8,919	-	-	-	8,919
	174,397	-	-	-	**174,397**
Executive Director					
Ms LB Zondo (CEO)	633,639	33,554	-	6,217	673,410
	633,639	**33,554**	-	**6,217**	**673,410**
Executive staff					
Mr GA Clapisson	392,595	44,612	57,965	27,718	522,890
Dr ND Kgwadi	208,413	4,315	30,526	11,104	254,358
Dr AS Tsela	392,595	40,413	62,896	25,514	521,418
Mr S van der Woude	392,595	40,413	53,033	11,388	497,429
Mr PD Weideman	395,021	40,413	62,897	24,185	522,516
	1,781,219	**170,166**	**267,317**	**99,909**	**2,318,611**

		2003	2002
		R	R
9 Future operating lease commitments			
9.1	Equipment	**204,671**	190,627
	Vehicles	**78,697**	46,828
	Property	**1,745,796**	2,687,608
	Up to 1 year	**2,029,164**	2,925,063
9.2	Equipment	**311,109**	491,061
	Vehicles	**112,302**	19,885
	Property	**-**	-
	1 to 5 years	**423,411**	510,946

10 Related party transactions

		2003		2002	
Institution	Transaction type	Amount of transaction R	Amount received R	Amount of transaction R	Amount received R
Department of Minerals and Energy	State contributions	**7,282,000**	**7,282,000**	7,002,000	7,002,000

11 Notes to the cash flow statement

	2003	2002
	R	R
11.1 Cash generated by operations		
Operating surplus/(deficit)	**272,144**	(3,794,782)
Adjustment for :	**3,817,626**	4,753,694
Depreciation	**1,133,353**	1,204,010
Net loss on disposal of obsolete assets	**3,320**	84,600
Foreign exchange gain	**-**	-
(Decrease) / Increase in provision for leave pay and bonuses	**(184,562)**	128,684
Increase in provision for pension retirement benefit	**(624,000)**	-
Increase in provision for retirement medical benefit	**3,279,657**	3,414,137
Increase/(decrease) in provision for doubtful debts	**209,858**	(77,737)
Working capital changes	**(2,023,087)**	442,176
(Increase) / decrease in accounts receivable	**(2,201,217)**	760,569
Increase / (decrease) in accounts payable	**178,130**	(318,393)
	2,066,683	1,401,088

11.2 Cash and cash equivalents

Cash and cash equivalents comprise cash on hand. The carrying amount of these assets approximate their fair value. Cash and cash equivalents at year-end are represented by the following balance:

Cash on hand	**9,472,035**	7,554,619

ABBREVIATIONS USED IN THIS REPORT

ALARA – As Low As Reasonably Achievable
DEAT – Department of Environmental Affairs and Tourism
CoM – Chamber of Mines
CSS – Corporate Support Services
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
HR – Human Resources
IAEA – International Atomic Energy Agency
IDCC – Interdepartmental Co-ordination Committee (for the PBMR)
IDMC – Interdepartmental Disaster Management Committee
IRPA – International Radiation Protection Agency
IT – Information Technology services
JRC – Joint Review Committee
KEDC – Koeberg Environment Development Committee
KLBM – Koeberg Licensing Bases Manual
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
NGO's – Non-governmental organisations
NNR – National Nuclear Regulator
NNRA – National Nuclear Regulator Act
NTWP – Nuclear Technology and Waste Products
NUSSC – Nuclear Safety Standards Committee
PBMR – Pebble Bed Modular Reactor
PFMA – Public Finance Management Act
PRD – Power Reactor Division
PSETA – Public Sector Education and Training Authority
RASSC – Radiation Safety Standards Committee of the IAEA
RENS – Regulation of Natural Sources
RSD – Regulatory Strategy Division
SAR – Safety Analysis Report
TRANSSC – Transport Safety Standards Committee of the IAEA
UK NSD – United Kingdom Nuclear Safety Directorate
WASSC – Waste Safety Standards Committee of the IAEA
mSv – milliSievert
μSv – microSievert
Sv – Sievert

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