



Raad vir Kernveiligheid
Council for Nuclear Safety



Jaarverslag 1996/97 • Annual Report 1996/97

...ve and system...
... and commissioning of...
...ments shall be well documented, su...
...experience and significant new safety informa...
...rity of the regulatory body;

...on by analysis, surveillance, testing and inspect...
... physical state and the operation of a nuclear...
...ance with its design, applicable national safet...
...and conditions.

15. RADIATION PROTECTION

Each Contracting Party shall take the appropriate measures to ensure that the radiation exposure of the public from a nuclear installation shall be kept as low as reasonably practicable and shall be exposed to radiatic dose limits.

ARTICLE 16. EMERGENCY PREPARATION

Each Contracting Party shall take appropriate measures to ensure that on-site and off-site and emergency plans for nuclear installations and cover the emergency.

For any new nuclear installation it commences operation...

ii Each Contracting Party shall ensure that they are likely to be provided with the competent personnel and resources...

HAVE AGREED as follows:

Convention on Nuclear Safety

Preamble

The Contracting Parties

- i Aware of the importance to the international community of ensuring that the use of nuclear energy is safe, well regulated and environmentally sound worldwide;
- ii Reaffirming the necessity of continuing to promote a high level of nuclear safety worldwide;
- iii Reaffirming that responsibility for nuclear safety rests with the State having jurisdiction over a nuclear installation;
- iv Desiring to promote an effective nuclear safety culture;
- v Aware that accidents at nuclear installations have the potential for serious impacts;
- vi Keeping in mind the Convention on the Physical Protection of Nuclear Material (1997), the Convention on Early Notification of a Nuclear Accident (1986), the Convention on Assistance in the Event of a Nuclear Accident or Radiological Emergency (1986);
- vii Affirming the importance of nuclear safety - through the establishment of this instrument;
- viii Recognizing that this Convention affirms fundamental safety principles and that these safety standards and that they are updated from time to time and so can provide guidance on contemporary means of achieving a high level of safety;
- ix Affirming the need to begin promptly the development of an international convention on the safety of radioactive waste management as soon as an ongoing process to develop waste management safety fundamentals has resulted in broad international agreement;
- x Recognizing the usefulness of further technical work in connection with the safety of other parts of the nuclear fuel cycle, and that this work may, in turn, facilitate the development of current or future international instruments;

ARTICLE 12. HUMAN FACTORS

Each Contracting Party shall ensure that human factors are taken into account throughout the life of a n...

ARTICLE 8. REGULATORY BODY

- i Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.
- ii Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organisation concerned with the promotion or utilization of nuclear energy.

ARTICLE 9. RESPONSIBILITY OF THE LICENCE HOLDER

Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.

C. General Safety Considerations

ARTICLE 10. PRIORITY TO SAFETY



Each Contracting Party shall take the appropriate steps to ensure that all activities directly related to nuclear installations shall have priority to nuclear safety.

ARTICLE 11. HUMAN RESOURCES

- i Each Contracting Party shall take the appropriate steps to ensure that adequate human resources are available to support the safety of each nuclear installation.
- ii Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of persons with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear installation, throughout its life.

ARTICLE 12. HUMAN FACTORS

Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installation.

A. 12. OBLIGATIONS
General Provisions
S. 11 apply to the safety of nuclear installations
... body to the ... design, construction, ... of a nuclear installation.

Die Raad • The Council



Prof John Martin
Chairman
Voorsitter



Prof Krish Bharuth-Ram
Vice Chairman
Ondervoorsitter



Prof Simeon Taole



Dr Daan Reitmann



Dr Thomas Auf der Heyde



Prof Hannes Klopper



Dr Maki Mandela



Mr/Mnr BC Winkler

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<i>In the aftermath of the accident at the Chernobyl Nuclear Power Station in the Ukraine, the International Atomic Energy Agency decided that an international convention must be developed to enhance the safety of land based nuclear power stations. Thus the Convention on Nuclear Safety was born. South Africa signed this Convention on 21 September 1995, ratified it on 24 December 1996 and it is now on the threshold of being implemented. This Convention is the theme of this annual report. On the inside cover as well as on selected inside pages, excerpts of this important Convention are given.</i>		
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**Raad vir Kernveiligheid
Council for Nuclear Safety**

Mission Statement

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

Policy:

The policy of the Council is:

- ✎ to address the risk of nuclear damage through the application of a quantitative risk assessment approach;
- ✎ to be cost effective in meeting its objectives and fulfilling its functions;
- ✎ to evaluate the extent to which it meets its objectives.

Strategy:

Its strategy is to accomplish this mission through:

- ✎ The exercise of responsible and effective regulatory control,
- ✎ the promotion of a quality and safety culture, both within and outside its own ranks, and
- ✎ the consistent endeavour to maintain the highest level of integrity, professionalism and independence.

applying the skills of its staff in developing and implementing sound regulatory practices embodying innovative techniques, and maintaining a standard that is comparable internationally.



**Raad vir Kernveiligheid
Council for Nuclear Safety**

Missie

Die Raad vir Kernveiligheid se missie is om persone en hul eiendom teen gevaar van skade, voortspruitend uit die voortbring of benutting van kernenergie en die verwante radioaktiewe materiale, in die Republiek van Suid-Afrika te beskerm.

Beleid:

Die beleid van die Raad is:

- ☛ om die risiko van kernskade deur die toepassing van 'n kwantitatiewe risiko-analise vas te stel;
- ☛ om kostedoeltreffend te wees in die bereiking van sy doelwitte en die uitvoering van sy funksies;
- ☛ om die mate waarin hy sy doelwitte bereik, te evalueer.

Strategie:

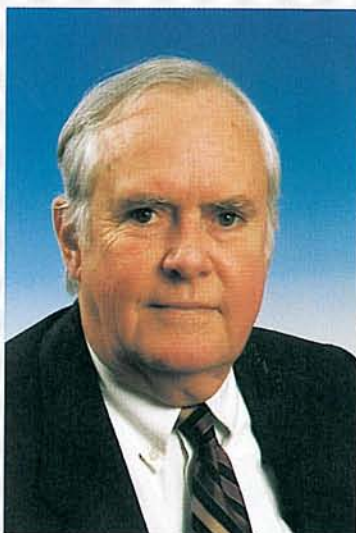
Om hierdie missie uit te voer deur:

- ☛ die uitoefening van verantwoordelike en doeltreffende regulatiewe beheer,
- ☛ die bevordering van 'n gehalte- en veiligheidskultuur, beide binne en buite sy eie geledere, en
- ☛ die konsekwente strewing om die hoogste mate van integriteit, professionalisme en onafhanklikheid te handhaaf.

deur die aanwending van die vaardighede van sy personeel in die ontwikkeling en toepassing van goeie regulatiewe praktyke wat vernuwende tegnieke omvat, en die handhawing van 'n standaard wat internasionaal vergelykbaar is.

Chairman's Report

In keeping with the ongoing transformation of our society, the Council for Nuclear Safety has continued its efforts to increase the transparency of its activities, and to increase liaison with its licensees, affected and interested parties, the general public and the media. This has resulted, in particular, in broader contact between the CNS and trade unions, NGO's and township schools.



Prof JB Martin

A first, and preliminary, meeting of a proposed standing committee of the Council on radiation standards has been held, and this will be formalized in 1998.

A considerable amount of work has been put into preparation for changes in the legislation governing the Council. This has involved widespread consultation with stakeholders, and has raised a number of important issues. One key issue, raised by the stakeholders, is that of the reporting line of the Council; is it appropriate that the Council report to Parliament through a Ministry which has responsibilities for two major areas in which the Council exercises regulatory authority? The draft bill has been submitted to the Minister through the Department of Minerals and Energy.

Increased international interaction, with the International Atomic Energy Agency (IAEA) and the International Commission on Radiological Protection (ICRP), provides confidence that the work of the Council meets exacting international norms. The Council is contributing increasingly to international programmes as participants or consultants, and this ensures that the staff of the Council is exposed regularly to international practice. The Council also looks forward to playing its full part in the implementation of the Convention on Nuclear Safety, which was ratified by South Africa on 24 December 1996.

The Council also anticipates that it will play a

role in the International Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. This Convention will provide a global approach to addressing radioactive waste, and will prevent the dumping of waste on our continent.

The visit of Dr Shirley Jackson, Chair of the United States Nuclear Regulatory Commission, was a particular highlight of the year. Dr Jackson presented the annual CNS Lecture, and held discussions with Mr Penuell Maduna, Minister of Minerals and Energy, and other officials.

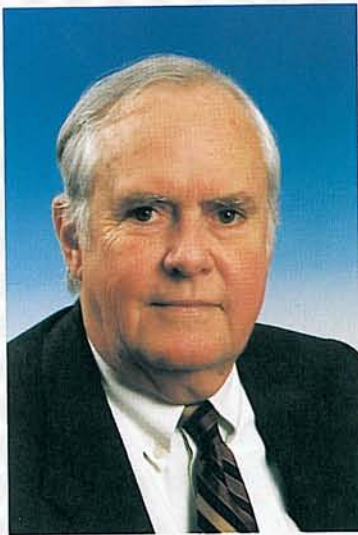
The Council has instituted a formal affirmative action programme, consistent with the requirements of the constitution and national legislation. Consultation with staff bodies is taking place to ensure that the policy has the full support of all members of the CNS.

I would like to thank the management and staff of the Council for their continued commitment to high standards. The work of the officers of the Council is both very demanding and requires a wide range of skills. The ability of the Council to attract and retain high calibre staff is essential to ensuring that nuclear regulation is carried out effectively in South Africa.

Chairman

Voorsittersverslag

In ooreenstemming met die voortgaande transformasie van ons gemeenskap, het die Raad vir Kernveiligheid voortgegaan met sy pogings om die deursigtigheid van sy aktiwiteite te verhoog. Dit sluit in verhoogde skakeling met lisiensiehouers, geaffekteerde en belangstellende partye, die algemene publiek en die media. Die gevolg was in die besonder breër kontak tussen die RKV en vakbonde, nie-regeringsorganisasies en skole in die buite-woongebiede.



Prof JB Martin

'n Eerste en voorlopige vergadering van 'n voorgestelde komitee van die Raad oor stralingstandaarde is gehou. Dit sal in 1998 geformaliseer word.

Heelwat werk is gedoen ter voorbereiding van veranderinge in die wetgewing wat die Raad beheer. Dit het wye konsultasie met alle betrokkenes ingesluit, en heelwat belangrike sake na vore gebring. Een belangrike aanleentheid wat geopper is, was dié van die Raad se rapporteringslyn: is dit wenslik dat die Raad aan die Parlement rapporteer deur 'n Ministerie wat die verantwoordelikheid het vir twee belangrike areas waar die Raad regulatoriese beheer uitoefen? Die konsep-wetgewing is aan die Minister voorgelê via die Departement van Minerale en Energie.

Toenemende internasionale interaksie, met die Internasionale Atoom Energie Agentskap (IAEA) en die Internasionale Kommissie vir Radiologiese Beskerming (IKRB) het die nodige selfvertroue verskaf dat die Raad aan streng internasionale norme voldoen. Die Raad se personeel dra in 'n toenemende mate as deelnemers of konsultante by tot internasionale programme. Dit verseker dat hulle voortdurend aan die beste internasionale praktyke blootgestel is. Die Raad sien ook daarna uit om sy volle rol te speel in die implementering van die Konvensie vir Kernveiligheid, wat Suid-Afrika op 24 Desember 1996 geratifiseer het.

Die Raad verwag ook dat hy 'n rol sal speel in

die Internasionale Gesamentlike Konvensie vir die Veiligheid van Verbruikte Brandstof Bestuur en die Veiligheid van Radioaktiewe Afval Bestuur. Hierdie Konvensie sal 'n globale benadering tot die hantering van radioaktiewe afval voorsien, en die storting van afval op ons vasteland verhoed.

Die besoek van dr Shirley Jackson, voorsitter van die VSA se Regulatoriese Kommissie, was 'n besondere hoogtepunt van die jaar. Dr Jackson het die jaarlikse RKV prestige-lesing aangebied, en samesprekings gehou met mnr Penuell Maduna, Minister van Minerale en Energie, en ander amptenare.

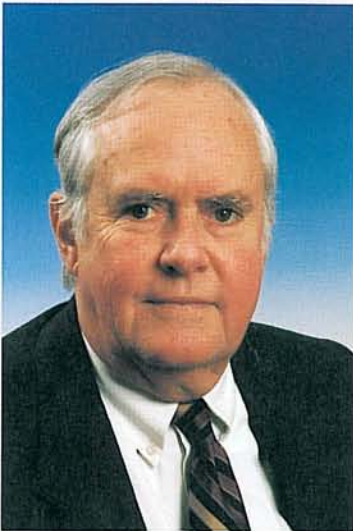
Die Raad het 'n formele program van regstellende aksie - in ooreenstemming met die vereistes van die grondwet en nasionale wetgewing - begin. Konsultasie met personeelverenigings vind plaas om te verseker dat die beleid die volle steun van al die lede van die RKV geniet.

Ek wil graag die bestuur en personeel van die Raad bedank vir hul voortdurende verbintenes tot hoë standaarde. Die werk van die Raad se personeel is baie veeleisend, en vereis terselfdertyd 'n wye reeks vaardighede. Die Raad se vermoë om personeel van 'n hoë standaard aan te trek en te behou, is noodsaaklik om te verseker dat kern-regulering effektief in Suid-Afrika geskied.

JB Martin
Voorsitter

Pegelo Ya Monna Setilo

Jaaka setshaba sa rona se ntse fetoga, Council for Nuclear Safety e dirile go ka tlaa seatla gore e bee ditiro tsa yone mo pepeneneng, le go oketsa dikgolagano le ba e ba fileng dilaesense, ba ba amegang le go nna le kgatlhego, setshaba ka kakaretso le bobega-dikgang. Seno se lerile, thata-thata, kgolagano e e kgolwane gareng ga CNS le mekgatlho ya badiri, di-NGO le dikolo tsa kwa makeisane.



Prof JB Martin

Sa ntlha, sa paakanyetso, go ne ga nna le kopano ya komiti ya kgotla ka ga radieishene, mme seo se tla konosediswa ka 1998.

Tiro e e kgolwane ya go baakanyetsa diphetogo mo melawaneng e e laolang kgotla e setse e dirilwe. Kgolagano le batsaa-karolo e ne ya atolosiwa, mme ga tlhagelela dintlha di le dintsi tsa bothokwa Ntlha e le esi e e bothokwa, e e tlhagisitswe ke batsaa-karolo, ke ya gore a go matshwanedi gore Kgotla e bebele palamente matona a a nang le maikarabelo mo mafelong a le mabedi a mo go one Kgotla e nang le dithata tsa taolo? Molao-tlhommo o setse o fetiseditswe kwa Lefapheng la Diminerale le Eneji.

Tirisano-mmogo e e oketsegileng, le International Atomic Energy Agency (IAEA) le International Commission on Radiological Protection (ICRP), a re fa boikanyo ba gore tiro ya Kgotla e lepa-lepana le dithokego tsa boditshaba-tshaba. Kgotla e na le seabe se se oketsegang mo manaaneng a boditshaba-tshaba jaaka batsaakarolo kgotsa bagolaganyi, mme seno se dira gore badiri ba nne ka gale ba ntse ba rakana le ditiro tsa boditshaba-tshaba. Kgotla ebile e solofetse go tsaya karolo fa go tsenngwa tirisong Convention for Nuclear Safety, e e neng ya amogelwa semmuso ke Afrika Borwa ka 1996.

Kgotla e boetse e solofela go tsaya karolo go International Joint Convention on the Safety of Spent Fuel Management le go Safety of Radioactive Waste Management. Kokoano eno e tla leba thata kgang ya ditlakala tse di

radioactive, le go thibela tatihelo ya ditlakala mo kontinenteng ya rona.

Loeto lwa ga Dr Shirley Jackson e ne ya nna le le bothokwa thata la ngwaga. Dr Jackson o ne a fana ka thuto ya ngwaga le ngwaga ya CNS, a bo a tshwara dipuisano le Rre Pennuelli Maduna, Tona ya Diminerale le Eneji, le baofisiri ba bangwe.

Kgotla e simolotse semmuso lenaneo la Affirmative Action, le le lepa-lepanang le molao-theo le melao ya bosetshaba. Kgolagano le boemedi ba badiri e a diriwa go netefatsa gore moonoo ono o nna le kemo-nokeng e e feletseng ya ditokololo tsothe tsa CNS.

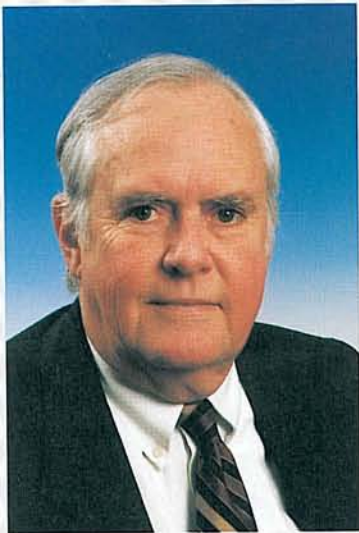
Ke rata go lebogela botsamaisi le badiri maitlamo a bone a boemo bo bo kwa setlhoweng. Tiro ya baofisiri ba kgotla e letsapa, mme ebile e batla le botswere bo bo tseneletseng. Bokgoni ba Kgotla ba go gogela le go tshola badiri ba ba matsetseleko bo bothokwa mo go netefatseng gore taolo ya nuclear e diriwa ka katlego mo Afrika Borwa.



Monna Setilo

Ingxelo Yomgcini-sihlalo

Ukuhlala sihambisana nenkqubo yotshintsho yoluntu lwethu, ikansile yokhuseleko kwisazulu (Council for Nuclear Safety) iye yaqhubeka ngamalinge ayo okwandisa iindlela ezifundeka ngokubonakalayo zenkqubo yayo, nokwandisa unxibelelwano nabanini-zimvume bayo, amaqela abandakanyekayo nanomdla, uluntu ngokubanzi noonondaba. Oku kuye kwaneziphumo, ingakumbi kuqhagamshelwano olubanzi phakathi kwekansile yokhuseleko kwisazulu (CNS) nemibutho yabasebenzi, imibutho engekho phantsi kolawulo lukaRhulumente (NGO's) nezikolo zasezilokishini.



Prof JB Martin

Kuqala, nokona kubalulekileyo, intlanganiso yesiphakamiso sekomiti emiyo yekansile ngokwemigangatho yokhupho-mitha (radiation) iye yabanjwa, kwaye iyakuba yemiselweyo ngo 1998.

Umsebenzi obonakalayo uthe walungiselelwa iinguqu kumthetho-nkqubo olawula ikansile. Oku kuthe kwabanga unxibelelwano oluthe saa nabanini-zabelo, kwaye kuthe kwavusa iqela lemiba ebalulekileyo. Omnye umba ongundoqo othe waphakanyiswa ngabanini-zabelo, ngulowo wengxelo yekansile : ingaba kusemgaqweni na ukuba ikansile inike ingxelo ePalamente ngobuphathiswa obujongene neengingqi ezizezona zibalulekileyo ezimbini apho ikansile inamandla okongamela khona ? Umthetho obhaliweyo oyilwayo unikezelwe kuMphathiswa ngeSebe leziMbiwa naMandla (Minerals and Energy).

Ukusebenzisana okuthe kwanda namanye amazwe, ne-International Atomic Energy Agency (IAEA) ne International Commission on Radiological Protection (ICRP), kunika ingqiniseko yokuba umsebenzi weKansile uhambelana ngqo neemfuno zamanye amazwe. IKansile inegalelo elandayo elenzayo kwi-inkqubo zamanye amazwe njengabathathi nxaxheba okanye abaqhagamshelanisi, kwaye oku kuqinisekisa ukuba abasebenzi beKansile basoloko njalo bekubona okwenziwa ngamanye amazwe. IKansile ngokunjalo ijonge ekudlaleni

indima epheleleyo ekusebenzeni kwe-Convention for Nuclear Safety, eyathi yafakwa ekhwapheni nguMzantsi Afrika nge 24 kuDisemba 1996.

IKansile ngokunjalo icinga ukuba iyakudlala indima kwi-International Joint Convention kwi-Safety of Spent Fuel Management nakwi-Safety of Radioactive Waste Management. Le ngqungquthela iyakuvelela lonke ihlabathi ngenkcazo ngenkunkuma enobungozi, kwaye ikhusele nokulahlwa kwenkunkuma kwilizwekazi lethu.

Utyelelo luka Dr Shirley Jackson, usihlalo we-United States Regulatory Commission, lwaba yeyona ncopho yonyaka. Ugqirha Jackson wabamba izifundo zonyaka ze-CNS, waze wabamba iingxoxo noMnu. Penuell Maduna, uMphathiswa weZimbiwa naMandla, nabanye abaphathi.

IKansile imisele inkqubo esemthethweni ye-affirmative action, ehambisana nokufunwa ngumgaqo-siseko nomthetho-nkqubo kazwelonke. Ukunxibelelana nemibutho yangaphakathi yabasebenzi kuyaqhubeka ukuqinisekisa ukuba ipolisi inenkxaso epheleleyo yawo onke amalungu e-CNS.

Ndithanda ukubulela abaphathi nabasebenzi beKansile ngokuzibophelela kwabo okungapheleliyo kumgangatho ophakamileyo. Umsebenzi wabasebenzi beKansile uyabanga, kwaye ufuna iziphwi ezibanzi. Ukuba namandla kweKansile ukutsala umdla nokugcina abasebenzi abakumgangatho ophakamileyo kubalulekile ukuqinisekisa ukuba imigaqo yesazulu ithotyelwa ngokubonakalayo eMzantsi Afrika.

JB Martin
Mgcini-sihlalo

Executive Officer's Report

During the financial year the Council for Nuclear Safety continued to play an ever-increasing role, both nationally and internationally, in its quest to fulfill its position as South Africa's nuclear watchdog.

A prime example of its commitment was that South Africa ratified the International Convention on Nuclear Safety on 24 December 1996. The Convention, which has as its aim the enhanced safety of land based nuclear power stations, requires, inter alia, South Africa to have a strong and independent nuclear regulator, i.e. the CNS.

The Council (or Board) of the CNS met six times during the reporting period under the chairmanship of Prof. John Martin of the University of Cape Town. During this time there was no change in the membership of the Council. Individual Council members also visited the Atomic Energy Corporation (AEC) and attended various seminars and meetings on matters pertaining to the nuclear field.

NUCLEAR AND RADIATION SAFETY

The mission of the Council for Nuclear Safety is to safeguard persons and their property against the risk of nuclear damage from the production or exploitation of nuclear energy and associated radioactive materials in the Republic of South Africa. The mission is realised through a regulatory control process carried out in terms of the Nuclear Energy Act. Various organisations engage in a range of activities within South Africa which require such control.

These include the mining and processing of radioactive ores and minerals, uranium processing, operation of a research and radioisotope production reactor, operation of the twin reactor Koeberg Nuclear Power Station, and radioactive waste management.

All these activities involve radioactive materials

and have the potential to give rise to radiation exposure to the workforce and to members of the public. The potential hazard associated with the various activities differs in character and magnitude. Hence the regulatory control process is by way of licensing the activities and subjecting them to whatever conditions are necessary to achieve an acceptable level of safety. Consideration is given to both normal operation of the facilities concerned and to all potential accidents that may lead to the exposure of persons to radiation. In addition, and particularly in respect of waste management activities, a consideration of importance is to protect future generations.

The licensing process requires the establishment of safety standards and the assessment of radiation-related risks associated with the activities in question in order to demonstrate prospectively that the safety standards can be met. From the safety assessment, conditions of licence governing both the design and operation of the facilities are formulated, and an ongoing programme of compliance assurance is established and implemented. The overall process is aimed at ensuring a safe working environment for the workforce, and that potential hazards to the public which may arise from any airborne or waterborne effluent discharges, waste disposal, transport of radioactive material and from any accidental releases, are adequately controlled.

These principles apply to the regulatory control of all activities, from handling small amounts of slightly contaminated scrap materials to the operation of major nuclear installations such as the Koeberg Nuclear Power Station. The nature and extent of design and operational provisions necessary to ensure compliance with the principles varies enormously between the various activities and are addressed in this report.

Koeberg Nuclear Power Station

The Koeberg Nuclear Power Station, a twin unit Westinghouse-type pressurised water reactor, was designed and constructed by a French consortium during the late 1970's and early 1980's. The two units were commissioned and came into commercial operation in 1984 and 1985 respectively. Since that time they have operated without any major safety related incident or accident. Nevertheless, such installations comprise complex engineered systems requiring careful testing, inspection, maintenance and monitoring. Assuring their ongoing safe operation requires extensive efforts to be expended on safety assessment, inspection and data collection and evaluation.

The areas with which the CNS concerns itself in respect of Koeberg are the prevention of accidents which may give rise to overexposure of workers or release radioactive material to the environment, and the control of normal operational activities such that exposure to the workforce and the public is monitored and in compliance with the system of radiation dose limitation laid down.

The prevention of accidents is achieved by ensuring the ongoing integrity and reliability of the plant equipment and all its safety systems and by ensuring its competent operation, maintenance, testing and inspection.

The control of radiation exposure to the workforce and the public is achieved by operational radiation protection and waste management programmes, and in order to mitigate the effects of any malfunction or accident, accident management and emergency planning arrangements must be maintained.

The various activities undertaken by the CNS during the review period to ensure the adequacy of safety provisions at Koeberg are presented hereunder.

SAFETY ASSESSMENT

Koeberg Safety Assessment Review

The licensing process in place for Koeberg requires that a valid and updated risk assessment be maintained. In monitoring licensing activities internationally, the CNS was mindful of the move towards conducting periodic safety re-assessments. Following a review of such practices elsewhere, the CNS concluded that the conduct of such an assessment was both timely and appropriate for the Koeberg Nuclear Power Station.

The safety re-assessment process that was developed is complementary to the licensing activities conducted to date and will achieve two primary objectives. Firstly, it will compare the design bases of the systems and components at Koeberg and the operating practice with current internationally recognised standards. Secondly, it will validate the risk assessment methodology employed and ensure that the plant still meets the risk criteria laid down in the fundamental safety standards of the Council, taking into consideration the cumulative effects of modifications and plant ageing. The project, which was developed in co-operation with Eskom, will contribute to ensuring the adequacy of the on-going safety review process. The project, which is named "The Koeberg Safety Report" (KSR), is multi-stage in nature and its execution plan was finalised during the year, following extensive discussions between the CNS and Eskom. The project has been broken down into several sub-projects, namely:

Project A - Safety Analysis Report (SAR) Update

This project consists of updating and consolidating the existing Licensing Safety Documentation to reflect the current plant status in a standard Safety Analysis Report. The latter will be structured along the lines of that currently used in France, and has been selected

Convention

The objectives of this

Convention are:

"to achieve and maintain a high level of nuclear safety worldwide through the enhancement of national measures and international co-operation including, where appropriate, safety-related technical co-operation"

THE COUNCIL

Convention

Definitions

for the purpose of this

Convention:

"licence means any authorization granted by the regulatory body to the applicant to have the responsibility for the siting, design, construction, commissioning, operation or decommissioning of a nuclear installation"

Council members

The names of Council members holding office for the financial year were as follows :

- ✍ Prof J B Martin, (Chairperson), Deputy Vice Chancellor, Research, University of Cape Town.
- ✍ Prof K Bharuth-Ram, (Vice-Chairperson), Head : Physics Department, University of Durban-Westville.
- ✍ Dr D Reitmann, former Director, National Accelerator Centre : Foundation for Research Development.
- ✍ Dr T Auf der Heyde, Senior Lecturer, Department of Chemistry, University of Cape Town
- ✍ Prof J F Klopper, Head : Department of Nuclear Medicine, Tygerberg Hospital.
- ✍ Dr M P Mandela, Assistant General Manager : Human Resources, Spoornet.
- ✍ Prof S H Taole, Physics Department, University of the North West.
- ✍ Mr B C Winkler, Executive Officer : CNS and ex officio member of the Council.

Audit committee

The following members served on the Audit Committee :

- ✍ Dr D Reitmann (Chairperson), Member of the Council and former Director, National Accelerator Centre : Foundation for Research Development.
- ✍ Dr T Auf der Heyde, Member of the Council and Senior Lecturer, Department of Chemistry, University of Cape Town.
- ✍ Mr O P Sadler, CA (External Member), KPMG Pretoria.

The Audit Committee met twice during the financial year. The main purpose of these meetings was to review the overall external Audit plan, the financial statements and the External Auditor's Report, all of which related to the previous financial year. The Committee also discussed financial management matters, one of which was the introduction of an internal audit, notwithstanding the exception obtained in this regard in terms of section 8 of the Reporting Act.

DIE RAAD

Convention

Regulatory body

"Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy"

Raadslede

Die name van die Raadslede vir die betrokke boekjaar was:

Voorsitter: Prof. John Martin, Adjunk-Vise-Kanselier, Navorsing, Universiteit van Kaapstad.

Ondervoorsitter: Prof Krish Bharuth-Ram.

Hoof: Departement Fisika, Universiteit van Durban-Westville.

- ☛ Dr. Daan Reitmann: Voormalige Direkteur, Nasionale Versnellersentrum, Stigting vir Navorsingsontwikkeling.
- ☛ Dr. Thomas Auf der Heyde: Senior lektor, Departement Chemie, Universiteit Kaapstad.
- ☛ Prof. Hannes Klopper: Hoof: Departement van Kerngeneeskunde, Tygerberg-hospitaal.
- ☛ Dr. Maki Mandela: Assistent Hoofbestuurder: Menslike Hulpbronne, Spoorwet.
- ☛ Prof. Simeon Taole: Departement Fisika, Universiteit van die Noordweste.
- ☛ Mnr. Bert Winkler: Uitvoerende Beampte van die RKV, ex officio-lid van die Raad.

Ouditkomitee

Die volgende was lede van die Ouditkomitee:

- ☛ Dr. D Reitmann (Voorsitter), lid van die Raad en voormalige Direkteur van die Nasionale Versnellersentrum, Stigting vir Navorsingsontwikkeling.
- ☛ Dr. T Auf der Heyde, lid van die Raad en Senior Lektor, Departement Chemie, Universiteit Kaapstad.
- ☛ Mnr. O P Sadler, GR (Eksterne lid), KPMG, Pretoria.

Die Ouditkomitee het twee keer gedurende die boekjaar vergader. Die hoofdoel van hierdie vergaderings was om die oorhoofse eksterne Ouditplan, die finansiële state en die Eksterne Ouditeursverslag - met betrekking tot die vorige en huidige boekjaar - te hersien. Die Komitee het sake oor finansiële bestuursaan-geleenthede bespreek waarvan een die instelling van 'n interne audit was, nietaenstaande die uitsluitel in hierdie verband ingevolge artikel 8 van die Wet op Verslagdoening deur Openbare Entiteite 1992 (Wet No. 93 van 1992).

as the international reference for purposes of comparison. Significant progress has been made throughout the year in updating the existing documentation verifying, for example, the inclusion of all plant modifications in the plant description and setting down the design bases. Comparison with the French reference commenced.

Project B - General Operating Rules (GOR) Update

The existing documented operational programmes (General Operating Rules) will be updated and consolidated as required. These include the operating technical specifications, the in-service inspection programme, the maintenance programme, the waste management programme, the operational radiation protection programme and the emergency plan. In view of the documentation associated with these programmes being maintained current, the updating and consolidation task has been straightforward and the comparison process is underway.

Project C - Differences and Safety Issues

The updated safety documentation, resulting from Projects A and B and reflecting the current Koeberg plant status, is being compared to the international reference, and differences are being identified. These will be screened for safety significance and dispositioned accordingly. A screening mechanism for this task has been developed during the past year.

Project F - Safety Re-assessment Process

Differences and potential safety issues arising from the above three projects will be prioritised and assessed in order to identify any measures necessary to address identified shortcomings or significant safety concerns. The detailed scope and methodology for this sub-project was finalised.

Supporting Sub-Projects D and E

On completion of the KSR project, scheduled for the end of 1998, it will be necessary for Eskom to have in place a trained and competent organisation to manage and maintain the updated and documented safety case (Project D). During the execution of the project it is also important that the current licence requirements are maintained valid throughout the duration of the KSR Project. This is in itself a discrete sub-project (Project E).

In order to achieve the required project objectives, comprehensive project management structures have been independently developed by both Eskom and the CNS. Regular project meetings have taken place to monitor the progress of the various phases of the project.

On completion, the KSR Project will provide a new impetus to the on-going safety review process culminating in a new "snapshot" of the safety status of the plant. It will present a comparison with current international norms and practices, provide verification of compliance with the CNS risk based criteria, and result in a focused licensing process.

Ongoing Review

A prominent feature of the ongoing assessment and control programme this year has been the CNS requirement for Eskom to review, and upgrade if necessary, the incident mitigation procedures to meet current international standards. This has been completed and Koeberg now possesses incident procedures comparable to any other nuclear power station world-wide. During this upgrade, the CNS identified other areas for improvement related to the behaviour of the plant following a possible loss of electrical power from the electricity grid. Work has been undertaken in conjunction with Eskom in the development of new measures to increase the reliability of electrical supplies to safety systems during off-site events.

Convention

The objectives of this

Convention are:

" to establish and maintain effective defences in nuclear installations against potential radiological hazards in order to protect individuals, society and the environment from harmful effects of ionizing radiation from such installations"

Advanced Fuel Design

The safety assessments for the proposed advanced fuel design, AFA-2GE, to be used in the Koeberg reactors, were finalised. The fuel is of a slightly higher enrichment (3.9%) than previously used and is designed to provide longer operating periods between refuelling. It also incorporates various enhanced safety features. Eskom submitted a comprehensive safety case to justify the use of this type of fuel at Koeberg. Following in-depth assessments and detailed technical discussions, some of which were held in France with the fuel manufacturer, the CNS concluded that the use of this new fuel would not result in an increase in the overall nuclear risk. The loading of this new fuel was approved and implemented on both Koeberg reactors.

Eskom is considering the introduction of further advanced fuel designs (up to 4.95% enrichment) at Koeberg. These will also be assessed by the CNS.

COMPLIANCE ASSURANCE

The safety assessment provides an assurance that the plant as designed can meet the safety criteria, provided it is operated and maintained strictly in accordance with the specifications and procedures laid down and that it is subject to the necessary testing and inspection programmes. These specifications and programmes are all included as conditions of licence and the CNS must ensure that they are all complied with. Assurance of such compliance is achieved by a system of inspection, monitoring and auditing, together with an ongoing evaluation of the results obtained as well as continued dialogue with the operator.

A great deal of information and data is generated annually. It has been necessary during this year to upgrade the CNS systems for analysing and interpreting the safety implications, and for ensuring inspection efforts are directed at areas of safety priority. Changes have also been made to the systems for submit-

ting proposed plant modifications and procedures and to the requirements for CNS approvals prior to certain actions by Eskom.

Occurrences

During the year Eskom improved the reporting, collation and analysis of all reported occurrences at Koeberg by developing a new Electronic Problem Management System. The CNS has full access to this computerised system and utilises the data to supplement its own occurrence and surveillance information so as to derive trends and indications of precursors to safety concerns. In addition to monitoring normal operations, the system is particularly useful in analysing the conduct of refuelling outages where work is carried out often under more stressful conditions, and the use of contractors can introduce additional problems. An emerging trend that the CNS will continue to follow and act on as necessary, is the increasing incidence of human errors attributable to factors such as production pressure and non-adherence to established rules.

As evidence of this, an incident occurred in March 1997 at Koeberg during the refuelling shutdown of Unit 2 when three Eskom employees entered a controlled zone in contravention of existing procedures, and received unplanned doses of radiation. Although the doses did not exceed the annual limit of 50 mSv laid down by the CNS, they did exceed Eskom's internal limit of 20 mSv per year. The doses received were well below the limit for any clinically observable effects. Nevertheless, the incident had implications for the safety of personnel. The incident was graded by the CNS and Eskom at a level 2 on the International Nuclear Event Scale (INES) and was reported to the International Atomic Energy Agency (IAEA).

As a result of this incident Eskom halted work on the outage until remedial measures required by the CNS and Eskom executive management had been put in place. A formal inquiry and follow up investigations were carried out, and

Convention

The objectives of this

Convention are:

"to prevent accidents with radiological consequences and to mitigate such consequences should they occur"

these specified short and long term measures to be implemented to address the concerns of the CNS. This incident did not in any way affect any of the power station's safety systems and there was at no time any risk to members of the public. It did, however, highlight the need for continued review of control systems and the maintenance of a good safety culture by all Koeberg's employees without yielding to undue pressure from electricity production deadlines. The CNS brought these aspects to the attention of Eskom's executive management for further consideration.

As for previous years, the occurrence database used to monitor operational trends for the verification of nuclear safety at Koeberg Nuclear Power Station was compared with trends worldwide. The performance was comparable with that elsewhere and generally satisfactory.

An important area of compliance assurance is the monitoring of deviations from normal practice or of operational incidents, even of a minor nature. This process is carried out through an occurrence reporting system that obliges the operator to identify, classify, record and report all occurrences. This system allows the identification of precursors to potentially more serious incidents, and prevents their development. The system also provides a database for comparison with similar nuclear power stations worldwide.

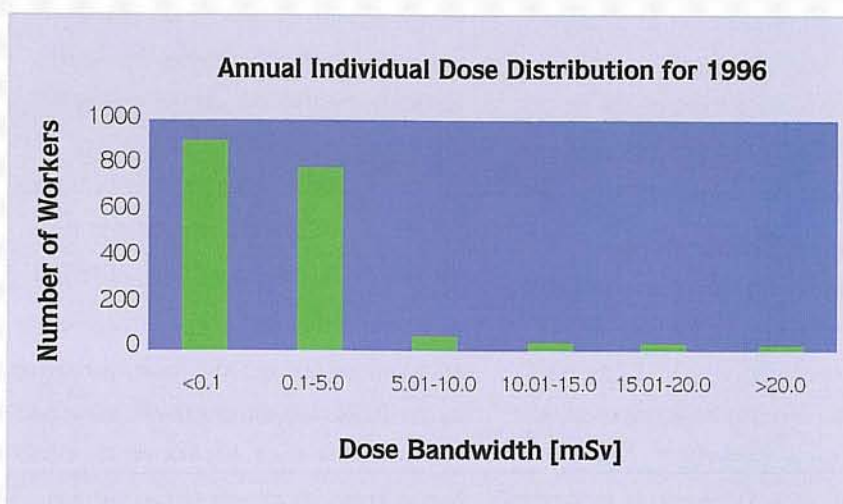
The Inspection Programme

The routine inspection programme addresses all requirements of the Koeberg licence and is conducted both during normal operation and during the maintenance outage period. In the latter, the inspections conducted are specific to the work undertaken during the outage. In general there was satisfactory compliance with requirements although an area requiring improvement was the document management system at Koeberg. Eskom addressed the CNS' concerns and the situation was rectified. This involved reorganisation of the Koeberg document management system, staff training, computerisation and upgrading of documents and extensive verification of safety related drawings and procedures. A comprehensive follow-up audit by the CNS found that the documentation control system at Koeberg had been radically improved and was acceptable.

In line with the CNS' policy of monitoring areas of potential concern, the CNS initiated a programme of upgrading the psychological testing and monitoring systems for operators during 1996. This coincided with the appointment of a new station psychologist at Koeberg together with the continuing need to keep abreast of current trends in the psychological monitoring field. The CNS' consultant psychologist provided significant support to Eskom in training the new psychologist. Work progressed on the formulation of revised testing instruments and psychological assessment methodologies for licensed operators. During this reporting period the CNS continued to conduct regular psychological monitoring of licensed operators and candidate operators. This continued to be an essential part of the assurance activities of the CNS, and work commenced on the analysis of the impact of human errors and safety culture on the safe operation of Koeberg.

A comprehensive in-service inspection programme is in place at Koeberg to monitor the continuing mechanical integrity of all safety

Figure 1



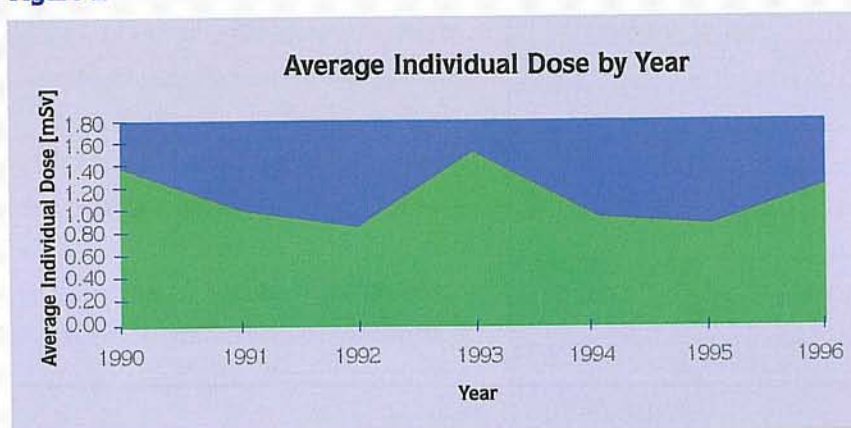
related components. It includes mandatory examinations of welds, piping, vessels, valves etc. It is based on the American ASME XI Code requirements and has been upgraded for the second interval, which came into effect after twelve years of operation, to incorporate international and local operational feedback and a probabilistic approach in the selection of non-mandatory welds.

Operational Radiation Protection

Radiation exposures to personnel working at Koeberg Nuclear Power Station are subject to control under the operational radiation protection programme. This programme enables the identification of situations that could lead to significant dose accrual, such that controls can be applied to ensure that no individual dose limit is exceeded, and that all doses are kept as low as reasonably achievable (ALARA).

The highest annual individual dose accrued during 1996 was 25 mSv compared to the regulatory limit of 50 mSv per annum. The total annual collective dose to the workforce for the year of 1996 was 2.2 Person-Sieverts. The total occupationally exposed workforce during 1996 numbered 1787 indicating an average annual individual dose of approximately 1.2 mSv. This compares favourably with the regulatory goal of 10 mSv per annum imposed on the average annual individual dose to ensure that all doses are kept ALARA. Figure 1 illustrates the dose distribution arising from the individual exposures accrued during 1996.

Figure 2



The major contribution to the total collective dose arose from two refuelling outages - the first on Unit 2 (outage 207) during January 1996 and the second on Unit 1 (outage 108) during July 1996. The collective dose for outage 207 and outage 108 were 0.88 Person-Sieverts and 0.87 Person-Sieverts respectively. The collective dose accrued as a result of the two outages contributed 79% of the total annual collective dose recorded for the year 1996. Figure 2 illustrates the variation in average individual dose from 1990 to 1996. The peaks evident for the years 1990, 1993, and 1996, are due to two outages occurring within those years.

It is evident that the outage collective doses after 1994 tend to be significantly lower than the collective doses of the outages before 1994. This was mainly as a result of the decrease in the scope of work executed during the later refuelling outages as well as a decrease in the duration of these.

Public Exposure

The process of nuclear power generation involves the production of various gaseous and liquid radioactive effluents that are treated by dedicated clean-up systems prior to their discharge to the environment. These systems remove most of the radioactivity from the effluents prior to discharge, with the remaining radioactivity contributing to exposure of the general public. This exposure is controlled within strictly defined limits by the implementation of a radiological effluent management programme.

The implementation of this programme 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) that are set by the CNS as a condition of licence. These quantities are established taking into account both the

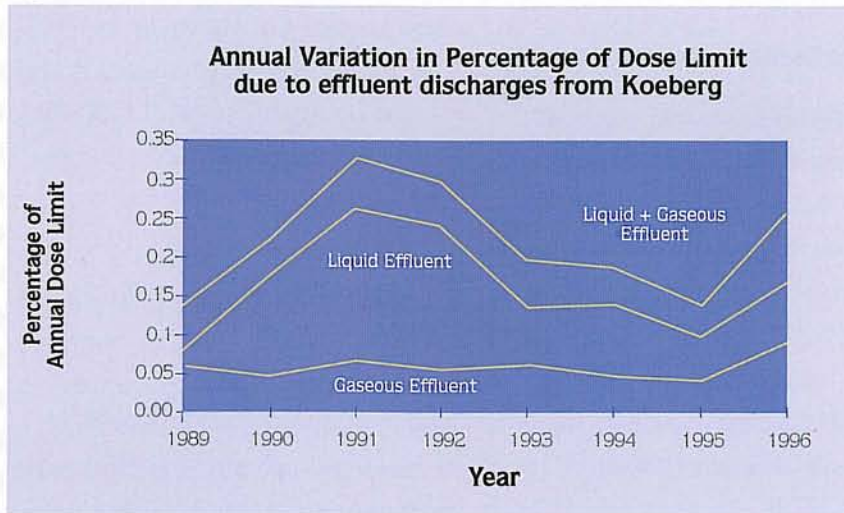
dose limit to members of the public and the ALARA principle.

Radioactivity in liquid and gaseous effluent discharged from Koeberg during 1996 contributed a total individual dose of 0.65 μSv with 65% of this dose resulting from radionuclides discharged in liquid effluent. This fell well within

the CNS criterion of 250 μSv per annum to the highest exposed member of the public (see figure 3). It is evident that the annual dose arising from effluent discharges from Koeberg has been consistently low at less than 1% of the CNS dose limit.

The radionuclides contributing the highest dose as a result of atmospheric and liquid discharges are shown in Table 1. Considering all discharges, tritium was found to contribute approximately 45% of the total dose to members of the public from Koeberg radiological effluent discharges in 1996.

Figure 3



Radioactive Waste Management

Generation of solid radioactive waste amounted to 1045 m³ in metal drums and 515 m³ in concrete drums. The total amount of processed solid low and intermediate level radioactive waste was 1560 m³. The inventory of the radioactive solid waste in drums is given in Table 2.

Owing to improvements adopted in the radioactive waste management programme and storage of drums on site, there was no shipment from Koeberg to the Vaalputs waste repository in 1996.

Environmental Surveillance

In order to verify that the environmental levels of radioactivity resulting from radioactive effluent discharges were consistent with predictions, a complementary programme of environmental surveillance was performed. This involved the sampling and analysis of environmental media. As part of the programme, samples of seawater and drinking water were analysed for tritium. The results showed that the relatively small amount of tritium released from Koeberg was masked by the tritium naturally present in environmental waters. The impact on external dose of gaseous activity released to the environment is monitored through the extensive Thermoluminescent dosimeter (TLD) network around Koeberg.

Table 1
% of AADQ Discharged in effluent during 1996

Atmospheric Transport Pathway		Liquid Transport Pathway	
Radionuclide	% of AADQ	Radionuclide	% of AADQ
¹³⁴ I	36	¹²⁴ Sb	26
¹³⁸ Xe	28	¹²⁵ Sb	23
³ H	23	³ H	16
¹³⁵ Xe	21	⁵⁷ Co	10

Table 2
Inventory of solid radioactive waste in various types of drums

Type of solid radioactive waste	No. of drums/y
C ₁ drums containing Non Compressible Waste	12
C ₁ drums containing concentrates	56
C ₁ drums containing resin	25
C ₂ drums containing resin	16
C ₂ drums containing concentrates	0
C ₄ drums containing filters	3
C _{2F} drums containing filters	9
210 litre drums containing general trash	469
210 litre drums containing resin	211

The TLD data did not give any indications of radiation levels in excess of background radiation levels. Sensitive gamma spectrometric measurement of water and food did not give any indication of environmental contamination, although insignificant amounts of Ag^{110m} were detected in mussels.

In line with the results from previous years, trace quantities of neutron activation products were detected in sludge from a local sewage farm. Higher concentrations of the medical isotope ^{131}I were also found in the sludge but such occurrences have been traced to patients residing in the vicinity of Koeberg and who have undergone radiotherapy treatment.

POPULATION DEVELOPMENT AND EMERGENCY PLANNING

One of the original objectives of siting Koeberg Nuclear Power Station north of Cape Town at Duynefontein in the Western Cape was that it would be a reasonable distance away from significant population centres. However, demands for space and development plans have increased dramatically in the area around Koeberg.

In order to ensure that development does not compromise the power station's emergency plan and that population densities are restricted, the CNS implemented a series of meetings with planners and decision makers to explain the CNS' philosophy of development control, and to agree to mechanisms for communication and input to the Western Cape development plans. The CNS chairs the Koeberg Environs Development Committee, which is a forum where representatives of the recently elected Local Authorities, Eskom, CNS, Provincial and National Government can discuss development policy and implementing procedures with the objective of avoiding unnecessary conflicts of interest.

This forum supplements the Koeberg Emergency Planning Liaison Committee, where the CNS also chairs a regular meeting with a

wide spectrum of local, regional and provincial bodies and other authorities.

The continued viability of the Koeberg emergency plan is demonstrated regularly during emergency exercises run by Eskom and the CNS. However, new challenges are set with the advent of informal settlements and the potential for uncontrolled concentrations of population in the Koeberg environs. The CNS expended much effort and participated in many meetings on this subject and related topics during the year, including the impact of the Cape Town Olympic bid on Koeberg.

CONTROL ROOM OPERATORS

Reactor operators are required by condition of licence to be individually licensed. This function is the major responsibility of the Operator Licensing Division of the CNS, aimed at ensuring that each individual meets the CNS minimum requirements of knowledge, skills and ability to control the Koeberg reactors during normal, abnormal and incident conditions. These minimum requirements are comparable with international norms for the licensing of operators.

The licensing process commences with a CNS examination of the broad-based theoretical knowledge required by an operator. A written examination is prepared and presented, covering electrical theory, mechanical concepts, thermodynamics, instrumentation and control, radiological protection and chemistry. On passing this examination the individual receives a CNS Generic Fundamentals Examination (GFE) Certificate. During this reporting period the CNS issued 21 GFE certificates. These certificates remain valid indefinitely.

GFE certificate holders, with the required additional training and experience, may then apply to the CNS for examination for a Reactor Operator licence.

The CNS examination is divided into three parts:

Convention

Legislative and regulatory framework: "each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations"

- * A written examination covering the individual's knowledge of normal, abnormal and incident operating.
- * A performance examination on the Koeberg full scope simulator covering the individual's ability to adequately manipulate the controls of the Koeberg reactors during normal operation, abnormal operation and incident events.
- * A performance examination on the plant covering operations performed remotely from the control room.

During this report period the CNS issued four new Reactor Operator licences.

A Reactor Operator licence holder, with the required additional training and experience, may then apply to the CNS for examination for a Senior Reactor Operator licence. A similar examination to that of a Reactor Operator is prepared and presented, however, at a higher level of knowledge and difficulty and with more emphasis on supervision and integrated plant response. A Senior Reactor Operator licence candidate is also required to sit a performance examination for the evaluation of his ability to perform the duties of an Emergency Controller should he ever have to act in this position. During this report period the CNS issued one new Senior Reactor Operator licence.

It is important to note that operator licences are issued for a period of two years only. To qualify for licence retention and subsequent renewal the individual must undergo regular periods of re-qualification training. The content and duration of this training is documented by the CNS and rigorously monitored by the CNS' examinations staff.

Trends have obligated the nuclear industry to become far more auditable and transparent at both national and international levels. From the resultant two-way flow of information it has become apparent that increased demands have been placed on licensed operators. To meet these increased demands, the CNS instigated,

with the co-operation of Eskom, the formulation of an Operator Enhancement Programme for Koeberg's current licensed operators early in 1996. This programme involved eighteen Senior Reactor Operators and thirty nine Reactor Operators and was divided into five parts:

- ☞ A one-week standard communications course presented by the United States Institution of Nuclear Power Operators (INPO).
- ☞ A two-week course on normal operating.
- ☞ A two-week course on abnormal operating.
- ☞ A one-week course on incident operating dedicated to steam generator tube ruptures, this being a critical area for additional training emphasis.
- ☞ A four-week course on incident operating.

Each of the operating courses commenced with an 'as found' evaluation. This evaluation was to determine that should the event have occurred on the plant the previous day the operator responses would have been adequate to deal with the event. The courses ended with an evaluation covering the material presented during the course. At the end of the ten weeks, a full re-qualification evaluation was conducted.

All simulator evaluation scenarios, and the written examination papers, were reviewed and approved by the CNS examiners prior to use. The CNS examiners attended all simulator evaluations. This was to ensure that:

- ☞ Eskom's in-house standards would exceed the minimum requirements.
- ☞ the Eskom evaluators fully applied their own standards.
- ☞ no licensed operator was allowed to work in an active licensed position unless he met those standards.

It is as yet too early to assess fully the success

Convention

"The legislative and regulatory framework shall provide for the establishment of applicable national safety requirements and regulations"

of this programme. However, there has been a marked reduction in reported occurrences due to operator error and an improvement in Koeberg's availability and reliability indicators.

Work is presently progressing on the philosophy and methodology for enhancing re-qualification training, to ensure that the Koeberg licensed operators will always compare favourably with their peers throughout the world.

The auditability, job applicability and accreditation of Koeberg's operator training programme has been the focus of CNS attention throughout this reporting period. The training courses are currently developed deterministically rather than systematically and the CNS and Eskom have given a high priority to the introduction of a "Systematic Approach to Training" (SAT) system that meets the recommendations of the International Atomic Energy Agency (defined in IAEA - TECDOC - 525). Work is presently proceeding on the creation of a task list which will be expanded into a plant specific job task analysis, in order to progress the implementation of "SAT" at Koeberg through new training programme design, development, evaluation and standardisation with the assistance of the United States Institution of Nuclear Power Operators,

In conclusion, it can be said that the application by the CNS of a stringent and transparent licensing process to control room operators continued to provide confidence that their per-

formance and capabilities were comparable internationally.

Atomic Energy Corporation

PELINDABA SITE

The Pelindaba site, some 30 km west of Pretoria, has just over forty nuclear facilities ranging from major facilities to various pilot plants, plants in decommissioning, other facilities and support laboratories. The major facilities include: the Uranium Conversion Plant, the Safari Research and Isotope Production Reactor, the Highly Enriched Uranium (HEU) Alloy Billet Production and Fuel Fabrication Facility, the Hot Cell Complex, the Isotope Centre and the Radioactive Waste Management Facilities.

Albeit on a lesser scale than Koeberg, the Safari Reactor warrants nuclear safety consideration owing to the possibility of an accidental release. The other facilities mainly give rise to issues of operational radiation safety and radioactive waste management. In these cases the CNS concerns itself with protection of both the workforce and the public from operational activities and the processing and storage of radioactive waste.

During the reporting period, the nuclear licence in force for the site, NL-27 (Variation 23), was changed three times. These variations incorporated two facilities, the Metox Zirconia

Convention

*"The legislative and regulatory framework shall provide for:
a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a licence"*

Table 3
Assessed submissions

Safety assessments	48
Facility Operating Technical Specifications	8
Facility Quality Management manuals	7
Facility Material Accounting manuals	3
Facility In-service Inspection manuals	3
Facility security manuals	3
Radiation Protection standards	8
Waste Management manual	1
Total	81

**Table 4
Submissions**

*	Clean-up of Trench 7 (Thabana)
*	C2 HEU Vault
*	Pipe storage Facility: HLW from the Hot Cell Complex
*	Boreholes at Thabana and CaF ₂ ponds for monitoring
*	Cutting and steam cleaning of contaminated components
*	Dismantling of D-Building
*	Metox Zirconia Beneficiation Pilot Plant
*	Operating Technical Specifications for the U Plant
*	Solid radioactive waste management at Pelindaba
*	Administrative Work Permit System
*	Removal of material from controlled radiological areas
*	Radiological surveillance
*	Reference levels and derived reference levels
*	Clearance levels for uranium contaminated components

SAFETY ASSESSMENT

Considerable progress was made in the evaluation of assessments during the reporting period as indicated by the number of submissions approved, as presented in Table 3. This work included several notable submissions as detailed in Table 4. Safety assessments that were developed but their review not completed, are detailed in Table 5. Safety assessments for ten facilities were still outstanding, namely: the package irradiation facility, waste management, laundry and decontamination facility, evaporation ponds and several laboratories and stores for contaminated equipment.

**Table 5
Submissions under review**

•	Pipe Store Facility: Safari spent fuel
•	Thabana: waste storage facility
•	UCHEM: production of HEU alloy billets
•	ELPROD: manufacture of Safari reactor fuel elements and control rods as well as target plates for ⁹⁹ Mo production
•	Isotope Centre: production of various radioisotopes for medical/industrial applications

Beneficiation Pilot Plant and the D-Building, (which was to be dismantled), and added eight additional licence documents associated with Radiation Protection, Waste Management and Material Accounting.

The licensing process, entailing both safety assessment and compliance assurance, is undertaken for all the various site facilities. Since subjecting the activities of the AEC to formal regulatory control by the CNS, all facilities have been required to review, revise and update safety assessments and bring their control documentation in line with the requirements of the CNS. At the end of the reporting period the safety re-evaluation process was 75% complete and the supporting documentation was 40% complete.

COMPLIANCE ASSURANCE

During the year the CNS conducted 184 licence compliance inspections, visiting each nuclear facility at least once. Compliance inspections were carried out mainly against the requirements of approved safety submissions, operating technical specifications, quality management, material accounting, in-service inspection, maintenance and security.

Issues of non-compliance identified during compliance inspections were formally taken up with the AEC for correction. Facilities and programmes where assessments had not yet been completed were not subject to formal regulatory inspections, although ad hoc inspections were conducted by the CNS.

OPERATIONAL RADIATION SAFETY

Occupational Exposure

Major progress was made in establishing formal standards on the various disciplines within the operational radiation protection programme of the AEC. These were incorporated into the licence.

Following the termination of uranium enrichment activities at the AEC, various facilities such as the Z-Plant and the Y-Plant were placed in the process of decommissioning. Whilst decommissioning has a minimal impact on members of the public, specific operational radiation protection programmes were developed to maintain doses to the workforce as low as reasonably achievable.

Operational control was mainly focused on the control of intakes of uranium ranging from low to high enrichment requiring, in some cases, special control arrangements. A good example was the radiation protection control programme for the handling and cutting of material contaminated with highly enriched uranium, for which special control and dosimetry provisions were instituted. This was necessary owing to the limited sensitivity of monitoring provisions at the AEC for lung-monitoring. Operations resulting in exposures of workers to highly enriched uranium in a chemical form classed as a "slow lung clearance compound", is a unique

situation requiring special control and personnel monitoring techniques.

Decommissioning gives rise to large quantities of contaminated material, mainly in the form of solid and liquid waste, that must be catered for by means of clearance mechanisms before being released from the site. This option is obviously preferred to disposal as waste, owing to reasons of economy. Clearance techniques and procedures are being developed, some of which have already been approved by the CNS. Control procedures for waste handling, interim storage and the quantification of the activity content of waste were addressed.

Generally, the radiation protection programme of the AEC was successful in controlling and maintaining operator exposures within the regulatory limits as well as within the ALARA guidelines set by the CNS. The total annual collective dose to the workforce for 1996 was 0.38 Person-Sieverts. The total occupationally exposed workforce during 1996 numbered 1127 indicating an average annual individual dose of approximately 0.34 mSv. This compared favourably with the regulatory goal of 10 mSv per annum imposed on the average annual individual dose to ensure that all doses are kept ALARA. Figure 4 illustrates the dose distribution arising from the individual exposures accrued during 1996.

Public Exposure

The radiological effluent management programme at the AEC received much attention in 1996. Authorised discharge quantities were established and kept under review. This was due mainly to an envisaged increase in the scale of operations at the Safari reactor and the Hot Cell Complex involving the production of ^{99}Mo .

As shown in Table 6 the maximum calculated dose to a member of the public for 1996, owing to both gaseous and liquid discharges was 5.84×10^{-5} Sv (58.4 μSv). This represent-

Figure 4

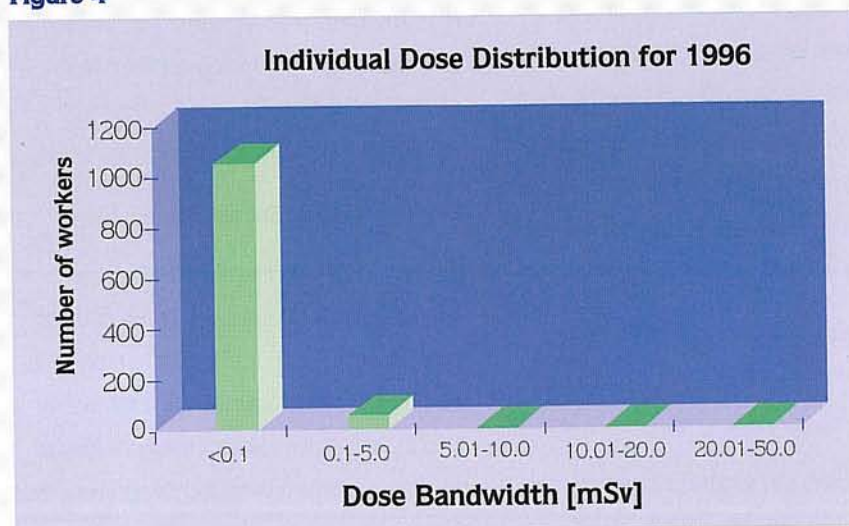


Table 6
Public Exposure

Gaseous Discharges		
	Activity Discharged	Annual Dose
	Bq	Sv
Uranium	1.75×10^9	3.85×10^{-6}
^{239}Pu	2.22×10^9	3.11×10^{-9}
^{90}Sr	1.15×10^{10}	2.19×10^{-6}
^{85}Kr	2.15×10^{10}	3.01×10^{-13}
Liquid Discharges		
	Activity Discharged	Annual Dose
	Bq	Sv
^{226}Ra	1.75×10^9	1.02×10^{-6}
Uranium	1.75×10^9	5.16×10^{-7}
^{90}Sr	1.75×10^9	1.65×10^{-6}
^{137}Cs	1.75×10^9	4.92×10^{-5}
Total dose owing to liquid and gaseous discharges		5.84×10^{-5}

Convention

"The legislative and regulatory framework shall provide for: a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences"

ed approximately 20 % of the annual dose limit. The majority of the dose was owing to liquid discharges containing ^{137}Cs from operations in Safari and the Hot Cell Complex. More work is being undertaken to study the behaviour of caesium in the environment, as initial determinations indicated that the dose due to caesium discharges was being overestimated.

Radioactive Waste Management

The variety of radioactive wastes generated by the AEC facilities is diverse. In addition, the AEC receives wastes from other generators such as medical users, research institutes and universities. Consequently, the radioactive waste management programme has been designed to accommodate the different types of wastes that arise. The solid wastes which were generated and stored at the AEC are described as follows:

- ☛ 213 drums (100 litres each) of solidified waste with a total uranium mass of 217.2 kg of which 8.7 kg is ^{235}U .
- ☛ 29 containers (28 litres each) from the molybdenum production programme,

which contained fission product waste. This waste is stored to decay in shielded containers.

- ☛ 59 m³ of compacted waste (262,3 kg of uranium) containing 10 kg of ^{235}U . This compacted waste was received from various facilities within the AEC for storage at Thabana;
- ☛ 233 m³ of compacted non-uranium waste, generated by facilities within and outside the AEC;
- ☛ 590 drums (100 litres each) of radioactive waste containing radioisotopes of short half-life generated by medical users, research institutes and universities.

Environmental Surveillance

One important potential pathway between radioactive material produced at the AEC and the public is through liquid effluent releases to the Crocodile River. Analyses for total radioactivity as well as for specific radionuclides was routinely performed in respect of sediment, fish and water samples taken from the river and

from the nearby Hartebeespoort Dam. No significant radioactive contamination could be detected in any sample. Analysis of locally produced milk, providing an indication of contamination from gaseous releases, indicated no contamination. Significant amounts of ^{60}Co and U were however found in the sewage sludge at the AEC. The origin of these was placed under investigation. The CNS commenced an independent survey of the Pelindaba environment.

OCCURRENCES

During the year 97 occurrences were reported and 82 occurrences were closed after acceptable corrective action. In total 46 occurrences remained open and regular progress reports on their resolution were submitted.

Of the 97 occurrences reported during the year 5% were classified as Level 1 (most serious), 56% as Level 2 and 39% as Level 3, for which no close-out reports are required unless specifically requested by the CNS. The reported occurrences varied from non-compliance with specified licence requirements (46%) and various minor incidents (40%), to exceeding the prescribed investigation dose levels (11%), and theft of contaminated material/components (3%).

No occurrences of a life threatening nature were recorded during the year and the greatest concern was in the area of compliance with licence requirements. In this respect progress was made to address this issue by the establishment of an internal AEC compliance audit programme focusing on the identification and resolution of non-compliance.

VAALPUTS NATIONAL RADIOACTIVE WASTE REPOSITORY

Variation 1 of Nuclear Licence 28 was issued during this period comprising a major first revision of the Vaalputs licence that was originally

issued in 1990. Changes to the licence related mainly to the inclusion of the updated Vaalputs Safety Report as well as the required licence documents addressing radiological effluent, environmental surveillance, in-service inspection, maintenance, quality assurance, security, meteorology, dose limitation, control of radiological hazards and emergency planning.

COMPLIANCE ASSURANCE

Four instances of non-compliance with Nuclear Licence 28 were reported during the year. The most significant instances were the general non-compliance with conditions of this licence identified during a CNS inspection and involved anomalies with the waste inventory records.

During the course of the inspection, 54 instances of non-compliance were noted. Although the majority of these were of minor safety significance, some were of greater significance to safety, for example, inadequate control over the waste trenches as radiological controlled areas, and waste trenches not managed in accordance with the safety assessment. It was concluded that there had been shortcomings in management and supervision at all levels, and the AEC was required to implement an effective internal mechanism to ensure compliance with the undertakings in the Vaalputs licence.

A moratorium was placed on the receipt of waste at Vaalputs and the AEC was requested to take various corrective actions. These included classifying, marking and managing the waste trenches as radiologically controlled areas. The AEC embarked upon an Action Plan to address the issues of non-compliance identified by the CNS inspection.

Mining and Minerals Processing

South Africa has for the past fifty years been one of the major producers of uranium in the world. The uranium has been produced mainly

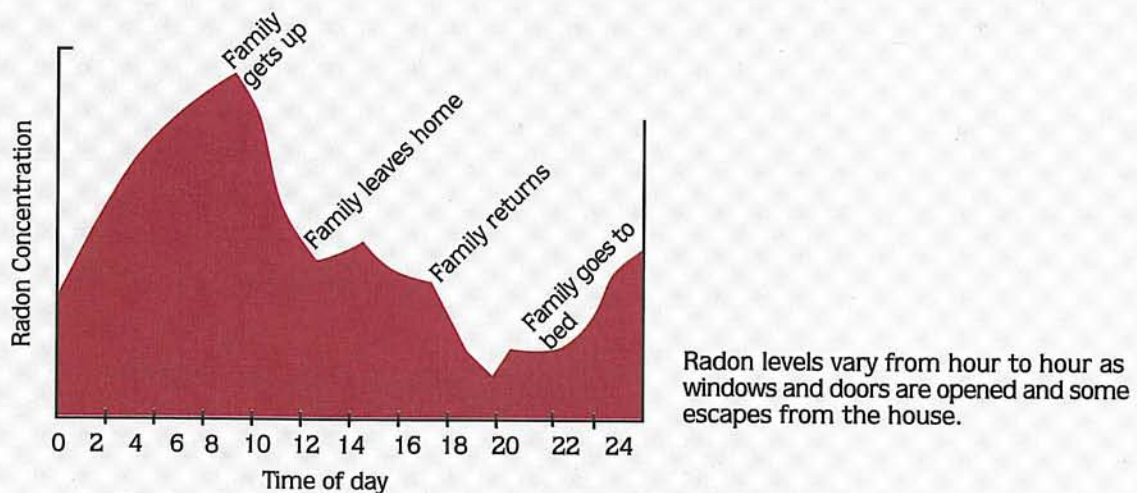
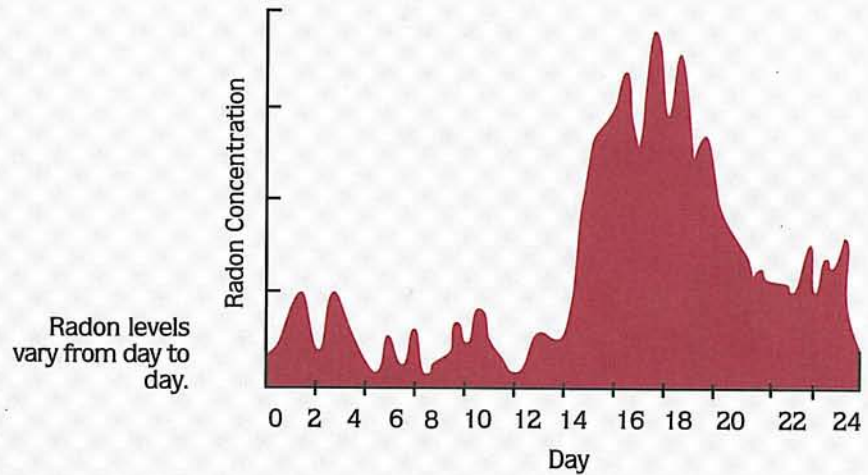
Convention

"The legislative and regulatory framework shall provide for the enforcement of applicable regulations and of the terms of licences, including suspension, modification or revocation"

What is Radon?

Radon is a natural radioactive gas. It comes from the uranium that occurs naturally in all rocks and soils and is given off at the surface of the ground. We all breathe it throughout our lives.

Out of doors it disperses in air so levels are very low.



Units

The quantity of a radioactive material is measured in becquerels.

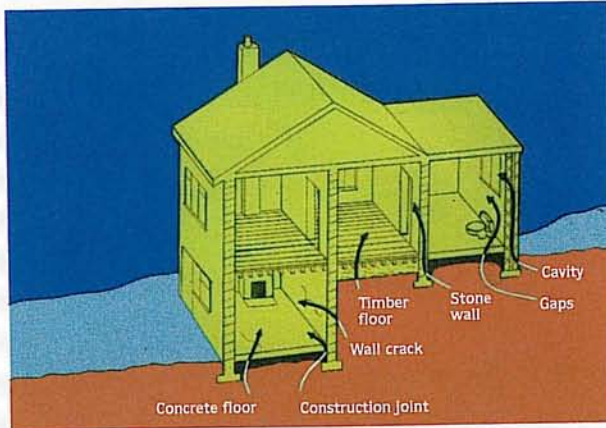
1 becquerel (1Bq) = 1 atomic disintegration per second.

The average amount of radon in every cubic metre of air in houses is 20 becquerels; that is, the amount of radon is such that 20 atoms disintegrate every second in every cubic metre.

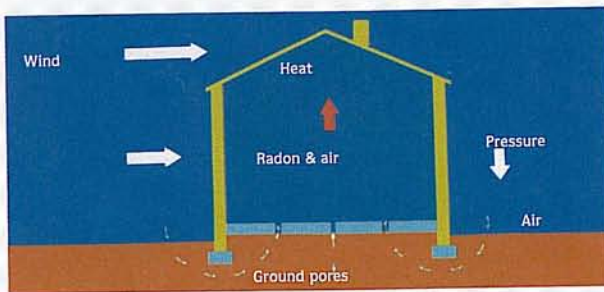
Radiation dose is measured in microsieverts or millisieverts.

A concentration of 20 becquerels per cubic metre of air gives a dose of 1 millisievert - this is the average annual dose from radon received by people.

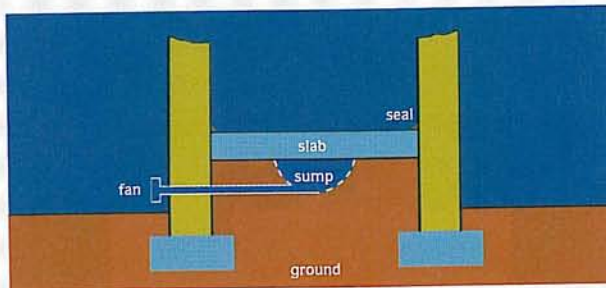
Radon in homes



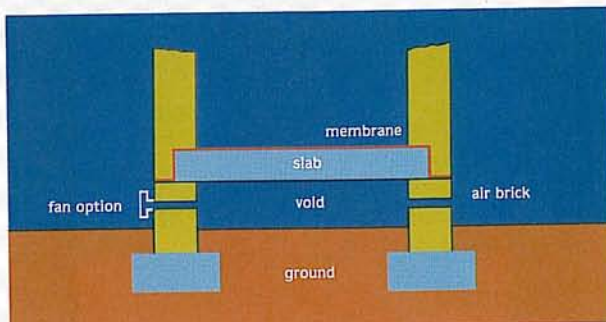
Radon gets into buildings from the ground in many ways.



Inside buildings the air pressure tends to be lower than outside so radon is sucked in through gaps in the floor.



Techniques to reduce high radon levels in buildings are being developed.



For new houses techniques can be introduced quite simply and cheaply that will prevent high radon levels.

as a by-product of mining gold and, to a lesser degree, copper. For the majority of this time, little attention was paid to the radiological problems associated with the uranium industry. It was only in the 1990's, following establishment of the Council for Nuclear Safety, that these problems were addressed and the industry was subjected to regulatory control in respect of controlling the associated radiological hazards.

The radiation hazards associated with mining and processing ores and minerals with elevated levels of natural radioactivity can affect both the workforce and the public. The workers in close proximity to the materials may be exposed to external radiation, radioactive aerosols and radon gas and its progeny. The public may be exposed owing to waste management activities, transport of associated radioactive material on public roads and from effluent discharges from mining and minerals processing facilities.

The regulatory process adopted was to require assessments of all these potential radiation hazards. Operational radiation protection and waste management programmes also have to be established where the assessment indicated this to be necessary. Other mineral deposits, not all of which are exploited for uranium, display elevated levels of natural radioactivity. Significant radiation hazards may be associated with extraction and processing. It has therefore been found necessary to address mining and minerals processing activities other than those associated directly with the extraction of uranium.

SAFETY ASSESSMENT

During the reporting period, fourteen more licences were granted to mining and minerals processing facilities. One licence was also granted to a user of small quantities of radioactive material, whilst another facility has surrendered its licence. At the end of the reporting period, the number of mining and minerals processing facilities and users of small quantities of

radioactive material licensed by the CNS was:

Mining and minerals processing facilities	52
Users of small quantities of radioactive material	23
Scrap re-cyclers	7
Total	82

Twenty-one licence applications are currently under consideration by the CNS.

During the reporting period, the CNS proceeded with investigations involving the following various types of facilities where potential radiation hazards exist:

1. Facilities mining and processing fluorspar

Three such facilities in the country have been identified and inspected. Based on the results of these inspections, the CNS informed the respective facilities of the relevant requirements of the Nuclear Energy Act.

2. Facilities processing zircon

Further investigations were conducted at these facilities. The CNS is currently in the process of preparing licences with conditions that are specifically relevant to such facilities. A workshop was also held in which operators of such facilities were advised on licence conditions and other requirements of the Nuclear Energy Act.

3. Gold mines

Gold mines with reefs similar to those in other licensed gold mines, were identified and will be subjected to investigations during the forthcoming year.

4. Fertiliser companies

Fertiliser companies applying production processes and using feed materials similar to other licensed fertiliser companies were identified and investigated. Based on the results of these investigations, the relevant companies will be informed about the requirements of the

Convention

Regulatory body:

"Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities"

Nuclear Energy Act.

5. Coal burning power stations

In view of the potential radiation hazards associated with fly-ash produced by such facilities, a programme was initiated to identify these.

6. Producers of building materials which are radioactive

The CNS embarked on an initiative to obtain information on, inter alia, the feed materials used, and processes applied, by such producers. This information will be used to prioritise an action plan in this regard.

CONTROL OF PUBLIC EXPOSURE TO RADIATION

The group of technical experts tasked to prepare guidelines on conducting the assessment of radiation hazards to members of the public from licensed mining and minerals processing facilities completed its work. A workshop was subsequently arranged where the content of the document was presented to various involved parties. Comments received on the document were taken into consideration in its finalisation. In the meantime, discussions were held with various licensees and consulting groups regarding both the results of parts of the completed assessments and proposals on further aspects of the assessments.

In the field of waste management, the results of the experiments conducted on the melting of scrap metal were used to finalise proposed requirements on the safe re-cycling of these materials. These proposed requirements were presented to the various involved parties for comment and subsequently finalised for implementation.

CONTROL OF OCCUPATIONAL EXPOSURE

Assessment of radiation hazards to the workforce progressed during the reporting period. The CNS finalised its guidance on surface hazard assessments taking due cognisance of comments received from interested and affected parties. The current status on the completion of hazard assessments is indicated in Figure 5. Overall, owing to more facilities being licensed, the degree of completion was below that achieved during the previous reporting period.

Based on the above-mentioned assessments, licensees prepared their radiation protection programmes to control the radiation hazards to the workforce.

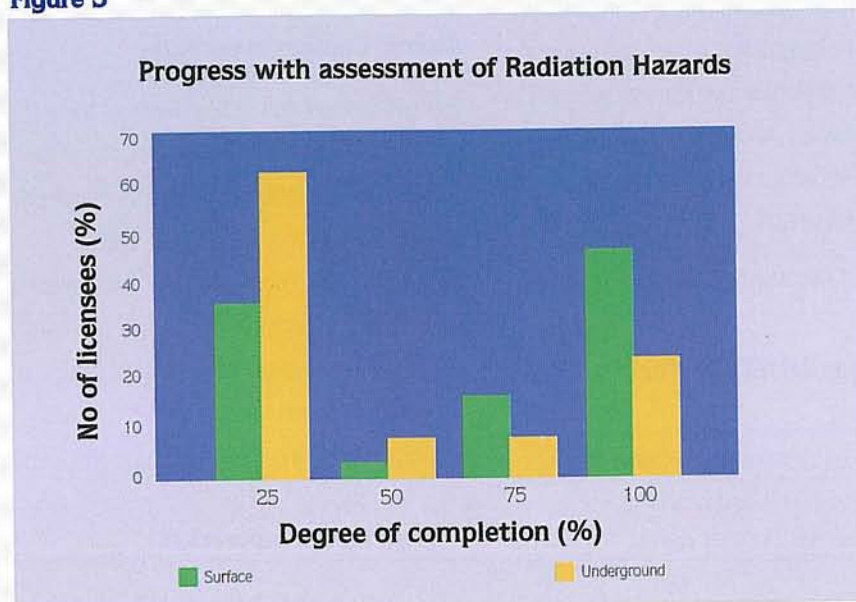
The CNS requires that the hazard assessments and radiation protection programmes be prepared and implemented by technically competent personnel. To demonstrate compliance with this requirement, most licensees utilised guidance provided by the CNS and submitted details of their radiation protection organisations.

Apart from radiation protection programmes, licensees are also required to establish medical surveillance and control programmes for workers who are occupationally exposed to radiation. Guidance in this regard was finalised during the reporting period. The CNS' medical consultant reviewed the programmes prepared in terms of this guidance.

COMPLIANCE ASSURANCE

Concurrent with the implementation of control programmes, the CNS increased its compliance

Figure 5



assurance activities at licensed facilities. During the reporting period these focused mainly on:

- ☛ maintenance and demolition of plants which process or processed radioactive material.
- ☛ the release of equipment from licensed facilities as scrap or for repair.

By the end of the period, approximately half the licensees had submitted their quality management programmes. A number of audits were conducted at these sites to determine the degree of implementation of such programmes.

CLEANING-UP OF OFF-MINE SITES

Owing to no resolution being achieved on the problem of storage and disposal of radioactive waste from off-mine sites, no further progress took place regarding the clean-up of the off-mine sites where the handling, storing and processing of contaminated materials from mines has resulted in contamination. Following an approach to the government in this regard, the matter remained under consideration by the Department of Minerals and Energy in consultation with the AEC and the CNS.

Other Projects

TRANSPORT OF RADIOACTIVE MATERIAL

In terms of the Nuclear Energy Act, the CNS is designated as the National Competent Authority for Transport of Radioactive Material in respect of the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material.

The IAEA first published regulations to promote

the safe movement of radioactive material in 1961. The regulations have since been revised from time to time with the latest edition being published in 1996. The basic objective of the regulations is to prescribe requirements whereby radioactive material may be safely transported without releasing dangerous quantities of radioactive material or giving rise to unacceptable exposure of people to radiation. The regulations have been adopted as the basis for controlling transportation of radioactive material in South Africa by way of obliging consignors to comply with these provisions.

Radioactive materials transported in South Africa today can be classified into two major categories. Firstly, there are those that are associated with the nuclear fuel cycle such as uranium oxides, uranium hexafluoride, radioactive wastes and concentrates containing naturally occurring radionuclides such as radium, uranium and thorium. The second category comprises radioactive materials, fabricated into sources that are used in research, industry and medicine. All radioactive materials, including radioactive wastes and contaminated materials and equipment associated with activities licensed by the CNS, are transported in accordance with the Regulations for the Safe Transport of Radioactive Material, and in terms of conditions of licence.

Atomic Energy Corporation

The last consignment of new fuel was transported from the AEC to Koeberg during 1996. Approximately twenty consignments of uranium samples were sent to the IAEA in Vienna, Austria. The total activity of these consignments was 10 TBq. In addition nine consignments of natural UF₆ were exported to various clients. A shipment of five tonnes of enriched UF₆ was also exported during the last year.

Nuclear Fuels Corporation

Consignments dispatched from NUFCOR are

Table 7

Uranium products transported from NUFCOR during 1996

Product	Number of consignments	total mass (tonnes)
Ammonium Diuranate	580	5 500
UO ₃	72	1 064
U ₃ O ₈	3	680

described in Table 7.

Concentrates containing Naturally Occurring Radionuclides such as Uranium and Thorium

Baddeleyite, a by-product of the copper mining industry, contains low levels of uranium and thorium. According to the IAEA transport regulations it is classified as Low Specific Activity Material Class I (LSA-I) material. Approximately 400 shipments, comprising a total mass of about 16 200 tonnes, of the product were transported within and from South Africa during the last year.

Contaminated Materials and Equipment

Large quantities of radioactive waste are generated during the normal operations of facilities handling radioactive material, especially in the mining industry. In addition, mining and minerals processing activities are continuously generating large amounts of contaminated materials and equipment (see Table 8). The mining industry produces an average of 150 000 tonnes of scrap steel annually. Of this about 10% is thought to be radioactively contaminated. This steel forms a valuable feedstock for the steel re-cycling industry and must be transported along public roads for processing. Such scrap steel is currently being transported as Surface

**Table 8
Scrap Material Transported during 1996**

Type of scrap	Restricted release	Unrestricted release
Timber etc.		15 000 tonnes
Metal	150 000 tonnes	

Contaminated Objects (SCO).

In addition some 200 000 items of potentially radioactively contaminated equipment were transported for repairs at facilities off mine sites.

Passage of Ships Conveying Radioactive Materials Around the Cape

A significant amount of attention was given in the media to the passage of ships containing radioactive waste and plutonium around the Cape. These ships transport the material between Europe and Japan as part of an arrangement whereby consignments of spent reactor fuel from Japan are shipped to Europe for re-processing and the residues from such re-processing, namely radioactive waste and plutonium, are transported back to Japan.

The trans-boundary transportation of any radioactive material is subject to various international agreements and conventions and, in respect of transport by sea, is subject to the Safety of Life at Sea (SOLAS) Convention. This Convention requires shippers to comply with the International Maritime Dangerous Goods (IMDG) Regulations which, in respect of radioactive material, embody the provisions of the IAEA Regulations for the Safe Transport of Radioactive Materials.

The shipper is obliged to demonstrate to the national competent authority in the country of consignment that all the provisions of the regulations are met prior to shipment. If a shipper complies with the necessary requirements, he is afforded the right of innocent passage and may pass through international territorial waters.

In addition, a Code of Practice known as the Irradiated Nuclear Fuel (INF) Code has been drawn up for ships transporting such material. This code requires that the design of the ship is able to withstand maritime accidents, that communications with the ship are maintained at all times and that the crew is suitably qualified to deal with any unusual circumstances which could conceivably arise, and that emergency response plans are maintained. The Code is not mandatory, although the shipping company involved with the shipment of the above mentioned consignments does comply with the provisions of the Code.

A considerable amount of assessment has been undertaken to estimate the effects of a severe

Confidence through disclosure

Amongst regulatory authorities, generally established to give protection to the public in some or other manner, those concerned with nuclear safety arguably have the most onerous task. The responsibility of regulating nuclear safety is awesome ; if this was ever in doubt the widespread consequences of the accident at Chernobyl amply demonstrated the devastating effects of inadequately regulated nuclear plants in the public domain.

The challenge facing a nuclear regulatory authority is to ensure that nuclear hazards, resulting from the radioactive properties of nuclear materials, are kept below internationally acceptable limits by subjecting them to a regulatory control process. Within this process, the operator and regulator have distinctly separate roles, as we shall see:

In South Africa, the determination of acceptable limits has historically been made by the nuclear regulatory authority. In so doing a principle adopted was that nuclear risks should not add significantly to the other risks to which society is exposed, either voluntarily or otherwise.

Wide powers are granted to the CNS through the governing legislation (Nuclear Energy Act, 1993), enabling it, inter alia, to attach conditions to licences and enter premises to conduct investigations.

However, the more prescriptive a regulator becomes, whether it be through licence conditions or regulations promulgated under the legislation, the less the licensee may be inclined to take ownership of safety. Indeed, in the extreme, prescription could lead to the operator expecting the regulator to

issue exact requirements regarding the execution of all its activities.

Furthermore, the regulator simply cannot reach on a continuous basis all the activities undertaken by licensees. Indeed, for it to monitor each and every action it might require at least as many staff as reside with the licensees. This would not only be cumbersome and expensive but it would create the impression that the regulator was running the licensee's business and allow the primary responsibility for safety to slip away from the operator to the regulator. This is unacceptable since a fundamental safety principle, accepted internationally, is that the organisation carrying out the activity must take responsibility for its safety implications. The role of the regulator is to ensure that appropriate safety standards are imposed, and to provide the public with assurance of compliance with these.

Although both prescription and inspection are suitably applied in South Africa, they have limitations in providing the required confidence in nuclear safety.

So, in practice how is the regulatory authority assured that risks are kept

acceptably low? After all, it cannot itself take direct charge of all the activities that must be controlled, and there is no means of measuring risk directly. To find the answer to this question we have to look to further provisions aimed at confidence-building in order that the requisite level of assurance can be obtained.

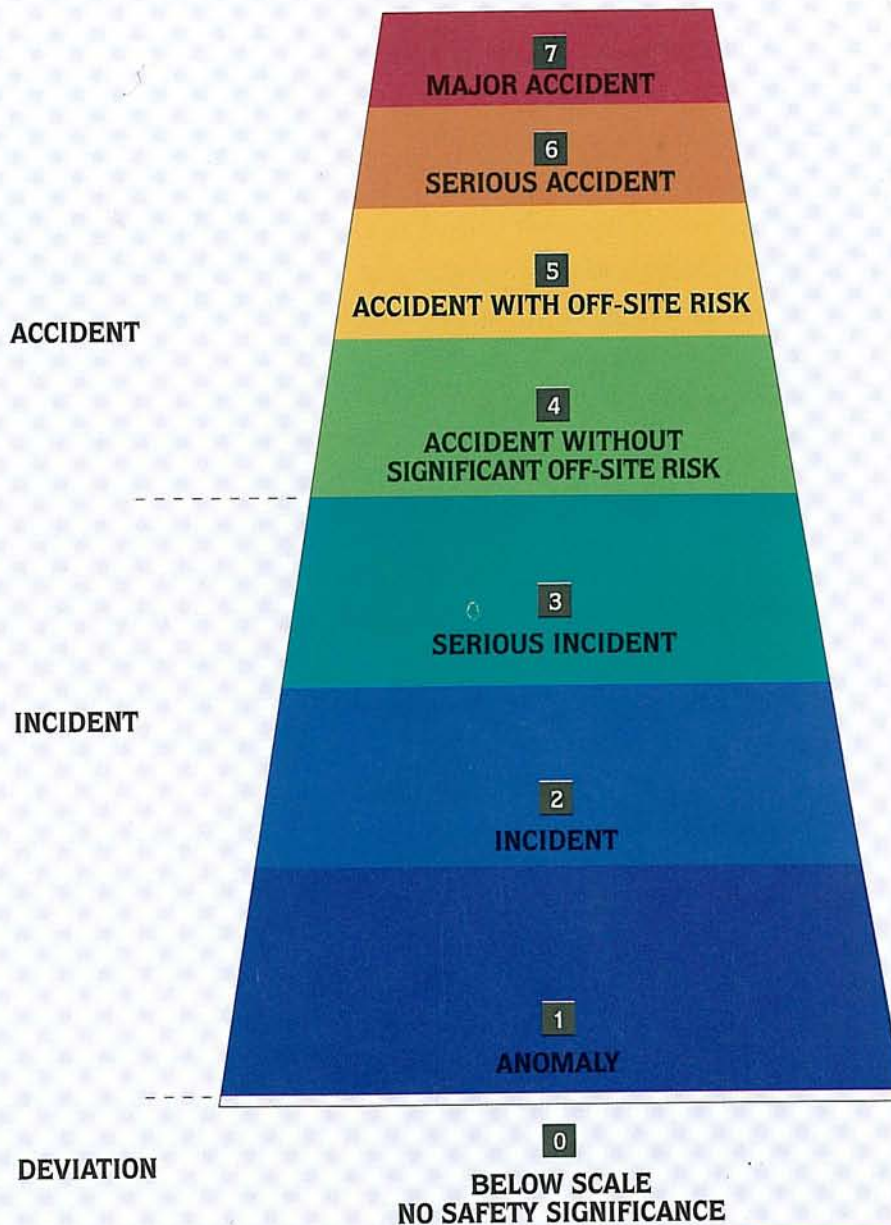
The CNS concluded that the approach it would take towards gaining the additional assurance from its licensees would stress their disclosing a range of data and information, the nature of which would be defined to ensure that the necessary parameters associated with nuclear safety were continuously monitored and kept under review.

An essential component of this approach is "occurrence reporting". Here, the licensee is required by licence condition to submit reports to the CNS on a pre-defined broad range of "events" relating to every aspect of the licensed activities. Many of these fit into the category of "safety indicators", and their analysis can be valuable in the identification of precursors to undesired events.

In CNS regulatory parlance a nuclear occurrence is an event which has been formally reported to it and receives analytical attention with a view both to assessing its significance and preventing recurrence. Many such occurrences are notified to the CNS over the period of a year. The practice of reporting these must be encouraged and supported by licensees' managements, since it forms a vital part of their own internal safety culture - the pervading sensitivity to the impact on

The International Nuclear Event Scale

For prompt communication of safety significance



safety of every action taken.

There is also an international aspect to reporting nuclear occurrences. The International Atomic Energy Agency (IAEA) has devised an international system for reporting nuclear events based on a scale akin to the Richter scale for earthquakes, and which is intended to facilitate reporting to and by the media, providing an immediate

understanding of the severity of the event. This is known as the International Nuclear Event Scale (INES) which ranges from 1 (no radiological effect) to 7 (catastrophic public consequences) - Chernobyl was rated 7 on this scale. This system bears a similarity to the licence condition imposed by the CNS in that the full spectrum of events is catered for, but

reporting of these events to the IAEA need only commence at level 2.

Nuclear Occurrence reporting, itself a broad safety goal, is therefore playing an increasingly important role in providing the CNS with the assurance of nuclear safety through the discipline that it imposes upon the licensee as a result of disclosure.

maritime accident involving a ship transporting such a cargo. The results to date indicate that the effect would not be serious. Such assessment work is continuing under the co-ordination of the IAEA. The CNS continued to monitor the results.

Should a ship transporting such a cargo wish to enter a South African harbour or sojourn in South African territorial waters (12 miles), it could only do so if licensed by the Council for Nuclear Safety. Such a licence could only be granted following a full safety evaluation. The shippers and consignors advise the government prior to routing consignments around the Cape, and provide information on the nature of the cargo.

Convention

Priority to safety:

"each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each licence holder meets its responsibility"

PEBBLE BED MODULAR REACTOR

As part of its investigations into meeting future energy needs, Eskom has been considering various nuclear generating options. Amongst these is a high temperature gas cooled reactor along the lines of the so-called pebble bed type design. These investigations have reached the stage where a concept design has been developed and it has been considered necessary that, in order to pursue the issues into the financial feasibility of such a design, licensing studies should be carried out.

To this end, Eskom submitted a draft of the safety analysis report/design intent for the Pebble Bed Modular Reactor (PBMR) concept for review by the CNS. Preliminary considerations were given to the licensing approach that would have to be adopted for this reactor design. A preliminary licensing approach for application to the PBMR design was developed and was presented at an IAEA International Technical Committee Meeting held in Johannesburg during November 1996. At the meeting, the suggested approach was met with general acceptance.

POST GRADUATE TRAINING COURSE IN RADIATION PROTECTION

From 1995 onwards an increase in co-operative activities with the IAEA took place. One area with which the Agency has a significant involvement is the provision of specialist training. To this end, a programme of regional and inter-regional training courses was conducted covering the areas of nuclear, radiation, waste and transport safety. Courses were also arranged in nuclear and radiation related technology.

The discipline of radiation protection was one where the need for training has been identified and a standard syllabus has been developed for the training of young professionals in this particular field. This course has been under development for some years at the inter-regional level with a view to devolving its presentation to a regional level in the light of the need particularly identified within the African region. An approach was made to South Africa to consider the local establishment of such a course which could be used also to fulfil regional training needs in radiation protection at the post graduate level.

Discussions were held with the various organisations employing radiation protection professionals who confirmed an ongoing need for such specialised training. Discussions were subsequently undertaken with the Schonland Nuclear Research Centre at the University of the Witwatersrand to explore the feasibility of establishing such a course at the University. This resulted in a project being formulated whereby the IAEA has undertaken to assist in the establishment of a radiation protection training centre at the University where the course will be presented.

The Schonland Centre will be the prime organiser of the course, assisted by the CNS, and a considerable amount of planning was undertaken during the year.

It is envisaged that around half of the students attending the course will be from South Africa and the other half from other African countries.

It is also envisaged that other shorter specialist training courses in radiation, nuclear and waste safety could be presented at the centre once it is established. The post graduate course will be presented over a full university semester. The first course is scheduled for 1999.

SUPPORTING ACTIVITIES

Legislation

Following the broad consultative processes that took place during the previous year, the staff of the CNS drafted proposals for new legislation addressing regulatory control over nuclear, radiation, radioactive waste and radioactive material transport safety. The proposals took into consideration the input received during the consultative process, the experience accrued in the past, more recent obligations in terms of international conventions and current international trends in nuclear regulatory practice.

The draft proposals were then subjected to an extensive programme of review by the Council for Nuclear Safety where the issue of nuclear governance, participation by interested and affected parties and the reporting line to government, were high on the list of considerations.

The proposals emanating from this review were that a National Nuclear Regulatory Authority should be established, comprised of three bodies namely: the Council for Nuclear Safety, the Office for Nuclear Regulation and the Standing Advisory Committee on Radiation Safety. The Council for Nuclear Safety would be responsible for the approval of standards for safety and regulatory practice and would oversee the work of the Office for Nuclear Regulation. The latter would carry out the day to day activities of nuclear regulatory control, primarily development of standards, safety evaluation and compliance assurance activities.

The Standing Advisory Committee would have

representation from operators of regulated activities, the workforce, public interest groups and interested government departments. The regulatory process itself has been broadened to include the processes of exemption, notification, registration and licensing to allow for a gradual process related to the propensity for hazard associated with the different regulated activities. At the end of the reporting period, an advanced stage had been reached prior to introducing the proposals to the Minister, the Department of Minerals and Energy and the parliamentary process.

National Radioactive Waste Management Policy

The process of developing a national radioactive waste management policy commenced in 1995 following a request to the CNS from the Minister of Minerals and Energy to facilitate such an initiative. Consultative meetings were held in early 1996 to identify the issues that needed to be addressed in such a policy.

The CNS produced a draft document identifying the radioactive wastes existing within the country and those that were generated on an ongoing basis. The document identified radioactive waste management options generally in line with current international practice that could be considered for adoption and these were used as a basis for further consideration.

A meeting was convened in October 1996 to which all interested and affected parties were invited and at which the document was presented and the options for a national policy considered.

During November 1996, advantage was taken of the presence in South Africa of experts on radioactive waste from several countries, and an international seminar on the Development of a National Radioactive Waste Management Policy was convened. This provided the opportunity for a broad spectrum of representatives from Parliament, industry, labour and non-gov-

Convention

*Financial and human resources:
"each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear installation throughout its life"*

environmental organisations, several government departments, as well as a representative of the IAEA, to gather first hand information about similar activities in a number of countries such as the United States, France, Argentina and the United Kingdom.

The seminar provided some very useful indicators for the policy development process. A further meeting was convened in December to consider the points arising from the meeting. A document was subsequently drafted, setting out the principles of radioactive waste management to be adopted and a strategy for implementation of the principles. The principles were based on the fundamental principles adopted by the IAEA and gave prime consideration to the safety of people and the environment and the assurance of a sustainable environment.

The document proposed responsibilities that should be assigned to the generators of radioactive waste, to operators of radioactive waste management facilities, to the regulatory authority and to the government. It ascribed financial responsibility for the safe management of waste both in the short and longer term to the operator, but also recognised the longer term responsibility of government to exercise whatever level of institutional controls were necessary to assure the ongoing adequacy of the adopted disposal options.

Fundamental to the strategy proposed was a strong effective independent regulatory regime and the establishment of a dedicated body responsible for radioactive waste management activities which would receive joint input from both the generators of waste and the government.

External Liaison

The activities subjected to regulatory control by the CNS covered a range of industries and were of interest to a broad spectrum of parties, both within the workforce associated with regulated activities, and within the public domain at both political and other levels.

As part of the normal regulatory function, continual liaison was maintained with the management of operating organisations. This was necessary in view of management having the prime responsibility for safety and the need for pertinent matters to be addressed. Nevertheless, it is increasingly recognised that dialogue must be maintained with all stakeholders concerned with the regulatory process, and increased efforts were expended to give effect to this dialogue. Efforts have been made to engage representatives of the workforce associated with all licensed activities. This has entailed a series of workshops and meetings aimed at establishing an understanding of the work and functions of the CNS. These efforts have met with some success, although a considerable amount of mistrust still prevailed and required continued efforts to overcome this.

One of the more successful areas of dialogue has been with the local authorities in the environs of the Koeberg Nuclear Power Station. Good liaison has been maintained through the emergency planning forums which have also provided an excellent channel of communication on all matters of concern to the authorities relating to the power station. The establishment of similar mechanisms appropriate for other major licensees has been ongoing throughout the year.

The highlight of the year in terms of external liaison activities was the visit of Dr Shirley Jackson, Chair of the United States Nuclear Regulatory Commission. Dr Jackson's visit took place during September 1996, and she presented the Annual CNS lecture in Johannesburg where she spoke about international trends in nuclear regulatory control.

During the visit she met with the Minister of Minerals and Energy, Mr Penuell Maduna. She also visited the Atomic Energy Corporation, Eskom Headquarters and paid a visit to the Koeberg Nuclear Power Station. Whilst in Cape Town she addressed the Institute of Nuclear Engineers.

Convention

Human factors:

" each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installation"

The CNS provided support to the annual meeting of the South African Radiation Protection Society that took place in Pretoria during 1996. The meeting was highly successful and radiation protection scientists and practitioners from the United Kingdom, the United States and Germany attended the meeting where discussions covered a broad range of issues related to radiation and waste safety.

International Conventions

South Africa formally ratified the International Convention on Nuclear Safety on 24 December 1996. The Convention comes into force in April 1997, and the Contracting parties are conducting meetings to finalise arrangements for implementation of the Convention. In essence, countries which become party to the Convention undertake to build and operate nuclear power stations according to internationally recognised standards of safety, and to submit their activities to international scrutiny through peer review. The arrangements established require each Contracting Party to periodically compile a report on the measures it has in place to fulfil its obligations in terms of the Convention. The reports are subjected to review by all the other Contracting Parties at a three yearly review meeting.

The Convention requires all countries to establish and maintain a competent regulatory authority with the necessary human and other resources in order to exercise effective regulatory control over the safe operation of nuclear power stations. The design and operation of these must be subjected to a thorough initial and ongoing safety assessment and must be operated by a competent operating organisation. Facilities must be properly maintained and subjected to appropriate testing and inspection programmes. Emergency arrangements must be in place to ensure that measures can be put in place to manage any accident that may arise and that the consequences of any accident can be mitigated. Provision must be in place for

operational control of radiation safety of the workforce and the general public.

The International Convention on Nuclear Safety was conceived following the Chernobyl accident and, during initial discussions on the Convention, considerable attention was given to its scope. Many countries wished to see a Convention encompassing all nuclear and related activities, in particular the safe management of radioactive waste. At that stage, which was in the early 1990's, there was still work being undertaken on developing an internationally accepted set of safety principles for the safety of radioactive waste management. It was considered premature to include radioactive waste at that stage.

Nevertheless, in the preamble to the Convention, the Contracting Parties stated that, upon endorsement of an internationally agreed set of principles for the safety of radioactive waste management, work should commence on a separate Convention dealing with radioactive waste. Agreement was reached on those fundamental principles early in 1995, and work commenced on the development of a Convention soon after and is still progressing.

The Convention is seen as a sister Convention to the Convention on Nuclear Safety and the draft to date is similar in many respects. The draft Convention commits Contracting Parties to safely manage their radioactive waste according to the internationally endorsed principles, and also to report upon such activities and subject the reports to an international peer review process. It also requires independent and competent regulatory control, safety assessment and effective operational management.

Several issues relating to the Convention were still unresolved and concerned matters such as inclusion of spent nuclear fuel, military waste and the trans-boundary movement of radioactive waste.

Six meetings have taken place of the group of

Convention

Quality assurance:

"each Contracting Party shall take the appropriate steps to ensure that quality assurance programmes are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of a nuclear installation"

legal and technical experts drafting the Convention, and a representative of the CNS has been a member of the group. The group met in South Africa during November 1996. This was somewhat unusual since such meetings are not normally held away from United Nations Agency locations. However, it was considered appropriate that such a meeting should take place within the African continent emphasising the need for broad participation and endorsement of such Conventions.

It is hoped that the group of experts would complete their work in drafting the Convention during the course of 1997.

International Participation

With a view to maintaining familiarity with developments internationally, the CNS undertook various initiatives which included establishing and maintaining liaison with regulatory authorities in other countries with similar responsibilities, with the International Atomic Energy Agency, particularly the nuclear, radiation, waste and transport safety functions, other international standard-setting bodies and professional associations. This liaison is aimed at information exchange, staff development and

orientation and participation in the development of safety standards in the areas of concern to the CNS.

Formal agreements had previously been established with the American and French Nuclear Regulatory Authorities. During the reporting period, agreements were concluded with the United Kingdom Nuclear Installations Inspectorate and the Argentinian Regulatory Authority.

Staff members of the CNS fulfilled a number of international roles. These included Chairman of the IAEA Radioactive Waste Safety Standards Advisory Committee, Publications Director of the International Radiation Protection Association, and a member of the International Nuclear Safety Advisory Group of the IAEA. Technical exchange visits were made to the United States Nuclear Regulatory Commission and the French Nuclear Regulatory Authority.

Several staff members were invited by the IAEA to act as consultants in the development of safety standards in the areas of governmental responsibilities, environmental impact assessment, safety culture, and environmental surveillance. In addition, staff members assisted in the

*Dr Dan Beninson,
Chairman, National Nuclear
Authority of Argentina, and
Mr. Bert Winkler, Executive
Officer of the CNS, sign an
agreement for cooperation.*



Agency's Technical Assistance programmes to provide consultancy services in respect of establishing national regulatory and radiation safety infrastructures in several developing countries and countries in Eastern Europe. Radiation protection experts from the CNS also contributed to the AFRA programme, which was developed around a regional grouping of countries within the African Region aimed at mutual assistance and co-operation in a range of radiation protection and waste management activities.

Administration and Control

PERSONNEL

Seventy-seven posts were filled at the end of the reporting period. Of these, fifty-one posts were filled by scientific, technical and engineering personnel and nine positions were filled by qualified personnel in the legal, personnel, finance, public relations and information technology fields. The remainder of the positions comprised clerical, secretarial and administrative personnel.

Although, as in previous years, staff turnover remained low, it was still necessary to recruit staff for certain vacancies and to this end an intensified recruitment campaign was launched to find suitable candidates from within the nuclear industry in South Africa.

A bursary programme was also established to recruit and train suitable candidates from the previously disadvantaged communities. In this regard respectable progress has been made to redress the imbalances of the past and to further the CNS commitment to make the staff composition more representative of the South African population as a whole.

Convention

Operation:

"each Contracting Party shall take the appropriate steps to ensure that: necessary engineering and technical support in all safety related fields is available throughout the lifetime of a nuclear installation"

Annual Financial Statements

COUNCIL'S REPORT 1996/97

Convention

Assessment and verification of safety:

"each Contracting Party shall take the appropriate steps to ensure that: comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life"

1. Nature of business

The Council for Nuclear Safety (CNS) was established in terms of Section 33 of the Nuclear Energy Act, 1993 (Act No 131 of 1993) to regulate and exercise control, through the granting of licences, over nuclear installations and other activities involving radioactive materials, including situations where the radioactive material is incidental to the main business of the licensee, with a view to the safeguarding of persons against nuclear damage.

2. State of affairs

The strategy of the CNS is to accomplish its mission through the application of sound regulatory practices, comparable internationally, utilising to the maximum extent the knowledge and skills of its staff in assessing nuclear safety by applying quantitative and qualitative risk assessment techniques and safety assurance programmes.

The activities of the CNS, aimed at the health and welfare of South Africa's public, continued to be entirely consistent with broad Government policy in this regard.

At year end the CNS had a total of 104 current licensees (1996 : 79 licensees), spanning the mining and minerals and nuclear energy sectors, and including incidental users of radioactive materials from the nuclear fuel cycle.

Through conducting regular inspections and safety assessments on these licensees, the CNS was able to assure itself of the overall status of nuclear safety on a national basis and to react in order to improve safety margins where it considered this necessary.

3. Operating results and financial position

The financial statements set out the operating results for the year. Income amounted to R26,615 m (1996 : R22,957 m), of which the contribution to expenditure by the State amounted to R5,271 m (1996 : R5,4 m), compared with the budgeted income of R28,057 m (1996 : R23,249 m). Expenditure amounted to R23,174 m (1996 : R20,591 m) compared with the budget of R24,879 m (1996 : R22,948 m).

The increase of 9.9% (R3,3 m) in licence fee income mainly reflected the growing attention required by the expanding range of activities. An increase of 11.7% (R1.9 m) in personnel expenses largely resulted from awarding the public service salary increases to staff, of whom several, at senior level, had not received increases in basic salary for two years.

The increase in bank balance and cash holdings mainly resulted from the accumulation over the previous two years of R2,8 m for the purpose of pre-funding medical subscriptions for pensioners and an amount of R380 000 set aside for the purchase of office accommodation for CNS regional staff in the Western Cape.

With regard to the former, the Minister of Minerals and Energy approved the Council's proposal, but the Minister of Finance was unable to support it further. In the latter case, the legal formalities involving transfer were delayed owing to re-zoning considerations.

The income funds therefore reflect the retention of these amounts.

4. Predetermined objectives

In order to develop further the undertaking in the previous report that additional work would be pursued to refine CNS objectives to permit quantifiable performance evaluation, the mission of the CNS and its strategic approach to achieving this were critically reviewed.

This provided the required sound foundation for a process leading to the identification of such objectives and addressed the need to facilitate judgements regarding the economic, efficient and effective utilisation of resources, notwithstanding the prevailing circumstances where, simply stated, the ultimate measure of the successful attainment of the CNS' statutory mission is the absence of nuclear damage.

As a result of this review it was concluded that priority attention was to be given to the following aspects in the manner described.

LEGISLATIVE

Objective

To support the activities aimed at preparing amended legislation in order to develop a separate Act for nuclear regulation involving all aspects of radiation safety.

Result

Discharging the responsibility of achieving public safety with regard to nuclear hazards requires, a priori, that the total effort be supported by appropriate legislation. In this instance, the enabling legislation is the Nuclear Energy Act which gives the CNS its mandate. Just prior to the commencement of the period under review, a national workshop consisting of interested and affected parties had been held paving the way for subsequent drafting of a new Bill on Nuclear Safety. A timescale for completing the draft during this period was set and achieved, the drafting process culminating in a document containing both specific propos-

als, for those areas where there was broad consensus from the consultative process, and options, for issues that required further debate prior to finalising the desired position. The Council was continually apprised of developments and decided that the options would need to be reviewed at a further stage of the collaborative process.

The extent to which the tenets of the Reporting Act, regarding utilisation of resources, can be upheld in practice crucially depends upon the way in which the amended Nuclear Energy Act itself identifies objectives for the CNS and provides for their achievement. The revisions proposed ensure improvements to the legislation from the regulatory experience acquired. It is our view that the resources expended in meeting this objective will represent a mere fraction of future benefits to be gained.

TECHNICAL

Objectives

1. To ensure that the regulatory processes culminate in the formulation of appropriate conditions of licence, and that suitable measures are established to determine compliance with these.
2. To ensure that, where appropriate, the expertise of the CNS is utilised to the benefit of the nation in areas that are contiguous with its regulatory responsibilities.

Results

1. Although over the past year the overall safety record of the country's major nuclear installations attests to the general suitability of the licence conditions, there was nevertheless a process of continuous improvement instituted specifically to challenge the efficacy of these conditions through review. Insofar as Koeberg was concerned, the Koeberg Safety Report (KSR) initiative, a three year project

Convention

Assessment and verification of safety:

"each Contracting Party shall take the appropriate steps to ensure that: verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions"

directed at a complete safety reassessment of Koeberg, with the intention of, inter alia, re-visiting technical safety bases and licence conditions, began in earnest.

Concurrently, the CNS continued with its institution of measures designed to determine compliance with licence conditions and further developed its approach towards demonstrating the assurance of safety through the identification of 16 specific projects focusing the priority deployment of effort.

With regard to the Atomic Energy Corporation and the remainder of the licensees, it is the Council's view that the licensing process remained effective in controlling potential radiation doses below the required acceptable levels in the industrial operations concerned.

2. Commensurate with the socio-political normalisation of the country, many opportunities have arisen for CNS staff to contribute to significant initiatives at both national and international level in areas related to their individual nuclear regulatory responsibility. Almost one-fifth of the CNS staff complement has been involved in this way. This has provided some valuable opportunities for career development as well as acknowledging the contribution that our regulatory staff can make.

HUMAN RESOURCES

Objective

To determine the optimum size of the regulatory staff complement and ensure staffing adequacy with appropriate consideration of representation, succession and training.

Result

The personnel requirements of the CNS were re-assessed from a zero-base viewpoint, bearing in mind the normal developing workload and the circumstances dictating the regulatory

regime. This analysis uncovered signs of strain being shown by the organisation as a result of addressing the wide range of technical commitments in the national and international areas and suggested the need for both an increased staff complement and some organisational restructuring. In addition, the need for establishing programmes for internal training and succession planning were identified.

Preparations commenced, involving all the staff, for the development of an affirmative action policy.

FINANCIAL

Objective

1. To ensure that the budget of the CNS is realistic for its mission.
2. To benchmark the costs of the CNS against similar activities performed elsewhere.

Results

1. As a matter of routine the CNS has for several years adopted a zero-base approach to preparing its annual budgets. This year's budget was no exception and, despite increases in expenditure related to general salary increases awarded within the public sector during the year, expenditure was still controlled within the approved budget, which over the year remained well within CPI increases. In order to achieve this, savings were effected by deferring expenditure and increasing productivity by not filling certain non-technical posts which became vacant owing to retirements. It is our opinion that although the CNS budget came under some pressure, and will require some attention in this regard for the future, it generally remained well-balanced and realistic for its mission.
2. (a) The charge-out rate for CNS specialists and project officers over the year was fixed at R271 per hour, representing an

Convention

Radiation protection:

"each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonably achievable and no individual shall be exposed to radiation doses which exceed prescribed national dose limits"

increase of 6.7% over the previous year's figure of R254.00 and comparing favourably with rates charged by organisations offering professional services.

2. (b) The CNS attempted to benchmark its costs against those for similar activities overseas. Since its salaries are presently determined within a system controlled by the Public Service Commission, emphasis was rather placed upon the level of its overheads. In this regard, in the one instance where sufficient data enabled a comparison to be made, it was revealed that a similar ratio of overheads to salaries existed.

Convention

*Emergency preparedness:
"each Contracting Party
shall take the appropriate
steps to ensure that there are
on-site and off-site
emergency plans that are
routinely tested for nuclear
installations and cover the
activities to be carried out in
the event of an emergency"*

PUBLIC RELATIONS

Objective

To promote an enhanced awareness of, and confidence in, the CNS with both the media and the public.

Result

This objective was achieved mainly through the pursuit of the CNS' regular business in communicating with an ever-increasing number and variety of interested and affected parties. Media attention was focused on the CNS at the time of the Koeberg emergency exercise, the visit of the Chairman of the US Nuclear Regulatory Commission, the International Radioactive Waste Management Seminar, the media briefings on the International Nuclear Event Scale and at the time of the shipment of radioactive waste around South Africa.

Presentations were made to both the Minerals and Energy and the Environment and Tourism Parliamentary Portfolio committees, and meetings were held with representatives of several NGO's and Trade Unions with interests in the nuclear domain.

A programme for developing a series of educational nuclear safety posters and leaflets was embarked upon. At the end of the period a

first draft of these together with an explanatory folder had been prepared for review.

INTERNATIONAL RELATIONS

Objective

To participate formally in national and international activities in order to obtain wider recognition of the CNS and its capacity.

Result

CNS staff members have continued to participate actively in international forums concerned with all aspects of nuclear, radiation and radioactive waste safety and made a substantial contribution towards the wider recognition of the capacity and capability of the CNS.

The mandating of the CNS by the former Minister of Mineral and Energy Affairs to facilitate the development of a national radioactive waste management policy also highlighted the constructive capabilities of the CNS and led to its wider recognition.

RAADSVERSLAG 1996/97

Convention

Emergency preparedness: "each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response"

1. Aard van besigheid

Die Raad vir Kernveiligheid (RKV) is ingevolge artikel 33 van die Wet op Kernenergie, 1933 (Wet No. 131 van 1993) tot stand gebring om deur die toekenning van lisensies, kerninstallasies en ander aktiwiteite rakende radioaktiewe materiaal, deur die uitreiking van lisensies, te reguleer en beheer daarvoor uit te oefen met die oog daarop om mense teen kernskade te beveilig. Dit sluit ook situasies in waar radioaktiewe materiaal toevallig voorkom met betrekking tot die hoofbedrywigheid van die lisensiehouer.

2. Stand van sake

Die strategie van die RKV is om aan sy missie te voldoen deur die toepassing van gesonde, internasionaal vergelykbare regulerende praktyke en deur optimaal gebruik te maak van sy personeel se kennis en vaardighede in die evaluering van kernveiligheid deur die toepassing van kwalitatiewe en kwantitatiewe risikobepalingstegniese en veiligheidsversekeringsprogramme.

Die bedrywighede van die RKV, wat gemik is op die gesondheid en welvaart van die Suid-Afrikaanse publiek, het steeds ten volle konsekwent gebly met 'n breë Regeringsbeleid in hierdie verband.

Aan die einde van die jaar het die RKV altesaam 104 lisensiehouers gehad, (1996: 79 lisensiehouers) wat verteenwoordigend is van die mynbou-, minerale- en energiesektore en met insluiting van toevallige gebruikers van radioaktiewe materiaal uit die kernbrandstofsiklus.

Deur middel van gereelde inspeksies by en veiligheidsevalueringe van hierdie lisensiehouers, was die RKV in staat om homself te vergewis van die oorhoofse status van kernveiligheid op 'n landswyse grondslag en om te reageer om

veiligheidsmarges te verbeter waar hy dit nodig geag het.

3. Bedryfsresultate en finansiële posisie

Die finansiële state sit die bedryfsresultate vir die jaar uiteen. Inkomste het R26.615m beloop (1996: R22.957m) waarvan die Staat se bydrae tot besteding R5.271m was (1996: R5.4m), vergeleke met die begrote inkomste van R28.057m (1996: R23.249m). Besteding het R23.174m (1996: R20.591m) beloop, in vergelyking met die begroting van R24.879m (1996: R22.948m).

Die toename van 20% (R3.3m) in inkomste deur lisensiegeld reflekteer hoofsaaklik die groeiende aandag wat deur die ontwikkelende reeks aktiwiteite vereis word. 'n Toename van 11.7% (K1.9m) in personeeluitgawes was hoofsaaklik die gevolg daarvan dat personeellede ook die algemene salarisverhogings vir staatsamptenare gekry het. Sommige amptenare op senior vlak het twee jaar lank geen aanpassing in hul basiese salarisse ontvang nie.

Die toename in die banksaldo en kontantreserwes was hoofsaaklik die gevolg van die ophoping van R2.8m oor die vorige twee jare met die doel om mediese bydrae vir pensioenarisse vooraf te befonds, asook 'n bedrag van R380 000 vir die aankoop van kantoorakkommodasie vir die RKV se streekpersoneel in die Wes-Kaap.

Met verwysing na eersgenoemde het die Minister vir Minerale- en Energiesake die RKV se voorstel goedgekeur, maar die Minister van Finansies was nie in staat om dit verder te ondersteun nie. In laasgenoemde geval is die wetlike formaliteite met betrekking tot oordragvertraag as gevolg van hersoneringsoorwegings.

Die inkomstefonds reflekteer dus die behoud

van hierdie fondse.

4. Voorafbepaalde doelwitte

Ten einde die onderneming in die vorige verslag, dat bykomende werk gedoen sal word om die RKV se doelwitte te verfyn sodat kwantifiseerbare prestasie-evaluasie toegelaat word, te ontwikkel, is die RKV se missie en sy strategiese benadering om dit te bereik, krities hersien.

Dit het die vereiste sterk basis voorsien vir 'n proses wat tot die identifisering van sodanige doelwitte kan lei, en die behoefte om uitsprake rakende die ekonomiese, doeltreffende en effektiewe gebruik van hulpbronne te vergemaklik, aangespreek. Dit is die geval niestande die heersende omstandighede waar, om dit eenvoudig te stel, die uiteindelijke maatstaf van die welslae van die RKV se statutêre missie die afwesigheid van kernskade is.

As gevolg van hierdie hersiening is besluit dat voorkeuraandag aan die volgende aspekte op die beskryfde wyse gegee moet word.

WETGEWEND

Doelwit

Om die bedrywighede te ondersteun wat gemik is op die voorbereiding van gewysigde wetgewing ten einde 'n afsonderlike wet vir kernregulering, insluitend alle aspekte van radioaktiewe veiligheid, te ontwikkel.

Gevolg

Ten einde te voldoen aan die verantwoordelikheid om te verseker dat openbare veiligheid met betrekking tot kerngevaar daargestel word, word vereis, a priori, dat die hele poging deur toepaslike wetgewing ondersteun moet word. In hierdie geval is die magtigingswetgewing die Wet op Kernenergie wat die RKV sy mandaat gee. Net voor die begin van die tydperk onderoorsig, is 'n nasionale werkswinkel bestaande uit belangstellende en geaffekteerde partye gehou ten einde die pad vir die skryf van 'n konsep van 'n nuwe Wetsontwerp op

Kernveiligheid voor te berei. 'n Tydskaal om die konsep tydens hierdie tydperk te voltooi, is daargestel en nagekom. Hierdie proses het gekulmineer in 'n dokument wat beide spesifieke voorstelle vir daardie gebiede waar daar breë konsensus was, en as opsies vir sake wat verdere bespreking vereis voordat die verlangde posisie gefinaliseer kan word, bevat het. Die Raad is voortdurend op hoogte van die ontwikkelinge gehou en het besluit dat die opsies op 'n verdere stadium van die samewerkende proses hersien moet word.

Die mate waartoe die beginsels van die Wet op Verslagdoening - betreffende die gebruik van hulpbronne - in die praktyk toegepas ken word, is beslissend aangewese op die wyse waarop die gewysigde Wet op Kernenergie doelwitte vir die RKV identifiseer en vir hul nakoming voorsiening maak. Uit hoofde van die regulerende ervaring wat opgedoen is, verseker die veranderinge wat voorgestel is verbeterings in die wetgewing. Ons is van mening dat die hulpbronne wat aangewend word om hierdie doelwitte te bereik, 'n blote breukdeel van toekomstige voordele wat bereik kan word verteenwoordig.

TEGNIES

Doelwitte

1. Om te verseker dat die regulerende proses in die formulering van geskikte lisensievoorwaardes kulmineer, en dat geskikte maatreëls ingestel word om die nakoming daarvan vas te stel.
2. Om te verseker dat, waar geskik, die kundigheid van die RKV tot voordeel van die nasie gebruik word in gebiede wat aangrensend tot sy regulerende verantwoordelikhede is.

Gevolg

1. Hoewel die oorhoofse veiligheidsrekord van die land se grootste kerninstallasies die afgelope jaar getuig van die algemene geskiktheid van die lisensievoorwaardes, is daar begin met 'n proses van volgehoue

Convention

Safety of installations:

"each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and implemented: for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime"

Convention

Safety of installations:

"each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and implemented: for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment"

verbetering, veral om die geskiktheid van hierdie voorwaardes deur middel van hersiening te bepaal. Insoverre dit Koeberg betref, het die Koeberg Veiligheids-verslag (KVV), 'n nuwe inisiatief, in alle erns begin. Dit is 'n projek wat oor drie jaar strek en wat gemik is op 'n algehele veiligheidsherwaarding van Koeberg met die doel om, onder meer, tegniese veiligheidsgrondslae en lisensievoorwaardes te herondersoek.

Terselfdertyd het die RKV voortgegaan met die instelling van maatreëls wat daarop gemik is om die nakoming van lisensievoorwaardes te bepaal en hy het ook sy strategie om veiligheidsversekering te demonstreer, verder ontwikkel deur die identifisering van 16 spesifieke projekte wat fokus op die voorkeur-ontplooiing van kragte.

Met betrekking tot die Atoomenergie-korporasie en die oorblywende lisensiehouers, is dit die Raad se siening dat die lisensieringsproses effektief gebly het om potensiele stralingsdosisse onder die vereiste aanvaarbare vlakke in die betrokke nywerheidsondernemings te beheer.

- In ooreenstemming met die sosio-politiese normalisering van die land, het baie geleenthede vir personeel van die RKV ontstaan om tot beduidende inisiatiewe, beide nasionaal en internasionaal, by te dra op gebiede wat verwant is tot hul individuele kernregulerende verantwoordelikheid. Bykans een vyfde van die personeelsamestelling van die RKV was op hierdie wyse betrokke. Dit het waardevolle geleenthede vir loopbaanontwikkeling voorsien, en het ook die bydrae wat ons regulerende personeel kan lewer erken.

MENSLIKE HULPBRONNE

Doelwit

Om die optimum grootte van die regulerende personeelkorps te bepaal, en om die geskiktheid van personeelvoorsiening met die gepaste oorweging van verteenwoordiging, opvolging

en opleiding te verseker.

Gevolg

Die personeelbehoefte van die RKV is vanaf 'n nulbasis herbepaal, met inagneming van die normale ontwikkelende werkslas en die omstandighede wat die regulerende staatsbestel voorskryf. Die analise het tekens van stremming, wat as gevolg van die aanspreking van die wye reeks tegniese verpligtinge nasionaal en internasionaal deur die organisasie getoon word, blootgelê. Die noodsaaklikheid vir 'n groter personeelkorps en 'n mate van organisatoriese herstrukturering is voorgestel. Bykomend hiertoe is die noodsaaklikheid om programme vir interne opleiding en opvolgingsbeplanning daar te stel geïdentifiseer.

Daar is ook, met die deelname van al die personeel, met die ontwikkeling van 'n beleid van regstellende aksie begin.

FINANSIEEL

Doelwit

- Om te verseker dat die RKV se begroting realisties vir sy missie is.
- Om die koste van die RKV te vergelyk met soortgelyke aktiwiteite elders.

Gevolg

- Roetinegewys het die RKV vir verskeie jare al 'n nulbasis-benadering gevolg ten einde sy jaarlikse begroting voor te berei. Hierdie jaar se begroting was geen uitsondering nie. Ten spyte van 'n toename in uitgawes vir algemene salarisverhogings wat gedurende die jaar in die openbare sektor toegeken is, is uitgawes steeds binne die goedgekeurde begroting beheer. Laasgenoemde het binne SPI toenames gebly. Om dit reg te kry, is besparings bewerkstellig deur uitgawes uit te stel en produktiwiteit te verhoog deur sekere nie-tegniese poste, wat weens aftredes vakant geword het, nie weer te vul nie. Ons is van mening dat, hoewel die RKV se begroting onder druk

is en aandag in die toekoms in hierdie verband nodig sal wees, dit oor die algemeen goed gebalanseerd en realisties vir sy missie gebly het.

2. (a) Die konsultasietarief vir RKV-spesialiste en -projekbeampies vir die jaar is teen R271 per uur vasgestel, wat 'n toename van 6.7% op die vorige jaar se syfer van R254.00 verteenwoordig. Dit vergelyk gunstig met die fooie wat gehef word deur organisasies wat professionele dienste aanbied.
2. (b) Die RKV het probeer om sy koste te vergelyk met die van soortgelyke dienste in die buiteland. Aangesien sy salarisse tans bepaal word binne 'n stelsel wat deur die Kantoor van die Staatsdienskommissie beheer word, is die klem eerder geplaas op die vlak van sy oorhoofse uitgawes. In hierdie verband het dit uit die een geval waar toereikende data beskikbaar was om 'n vergelyking te tref, geblyk dat 'n soortgelyke verhouding tussen oorhoofse koste en salarisse bestaan het.

OPENBARE SKAKELING

Doelwit

Om 'n groter bewustheid van en vertroue in die RKV by beide die media en die publiek te kweek.

Gevolg

Hierdie oogmerk is hoofsaaklik bereik deur middel van die RKV se gereelde bedrywighede waar hy kommunikeer met 'n altyd groeiende getal en verskeidenheid belangstellende en geaffekteerde partye. Die media se aandag was tydens die noodoefening by Koeberg, die besoek van die Voorsitter van die VSA se Kern Regulerende Kommissie, die Internasionale Seminaar oor Radioaktiewe Afvalbestuur, die mediakonferensies oor die Internasionale Skaal oor Kernvoorvalle en tydens die verskeping van radioaktiewe afval om die Suid-Afrikaanse kus, op die RKV gefokus.

Voorleggings is aan die Portefeuljekomitees van Minerale en Energie, en Omgewingsake en Toerisme gemaak en samesprekings is gehou met verteenwoordigers van verskeie nie-regeringsorganisasies asook met vakbonde wat 'n belang in die kernveld het.

'n Program om 'n reeks opvoedkundige plakkaats en biljette te ontwikkel wat oor kernveiligheid handel, is begin. Aan die einde van die tydperk is 'n eerste konsep hiervan saam met 'n verduidelikende omslag vir hersiening voorberei.

INTERNASIONALE VERHOUDINGS

Doelwit

Om formeel aan nasionale en internasionale aktiwiteite deel te neem ten einde groter erkenning vir die RKV en sy kapasiteit te verkry.

Resultaat

Personeelle van die RKV het steeds aktief deelgeneem aan internasionale forums rakende alle aspekte van kern-, bestraling- en radioaktiewe afval-veiligheid en het 'n belangrike bydrae tot groter erkenning vir die kapasiteit en moontlikhede van die RKV gelewer.

Die mandatering van die RKV deur die Minister van Minerale en Energie om die ontwikkeling van 'n nasionale radioaktiewe afvalbestuursbeleid te vergemaklik, het ook die konstruktiewe moontlikhede van die RKV uitgelig en het tot groter erkenning daarvan gelei.

Convention

Design and construction: "each Contracting Party shall take the appropriate steps to ensure that the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defence in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur"

REPORT OF THE AUDITOR-GENERAL

on the annual financial statements of the Council for Nuclear Safety for the financial year ended 31 March 1997.

Convention

Design and construction: "each Contracting Party shall take the appropriate steps to ensure that: the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis"

1. AUDIT ASSIGNMENT:

The accounts and the annual financial statements of the Council, set out in Statements 1 to 3 and the Notes thereto, have been audited in terms of section 3 of the Auditor-General Act, 1995 (Act No. 12 of 1995), read with section 49(4) of the Nuclear Energy Act, 1993 (Act No. 131 of 1993). These annual financial statements and the maintenance of effective control measures are the responsibility of the Council's Executive Officer. My responsibility is to report on these annual financial statements and the matters stipulated in the first-mentioned Act.

2. REGULARITY AUDIT:

2.1. Financial

2.1.1 Nature and scope: The audit was carried out in accordance with generally accepted government auditing standards. These standards require the audit to be planned and performed so as to obtain reasonable assurance that, in all material respects, fair presentation is achieved in the annual financial statements. An audit includes an evaluation of the appropriateness of the accounting policies; an examination, on a test basis, of evidence supporting the amounts and disclosures included in the financial statements; an assessment of the reasonableness of significant provisions; and a consideration of the appropriateness of the overall presentation of the annual financial statements. I consider that the audit procedures were appropriate in the circumstances to express the opinion presented below.

2.1.2 Audit opinion: In my opinion these annu-

al financial statements fairly present the financial position of and the results obtained by, the Council as at 31 March 1996 in accordance with the generally accepted accounting practice on a basis consistent with that of the preceding year. Furthermore, in my opinion, the information furnished in terms of sections 6 and 7 of the Reporting by Public Entities Act, 1992 (Act No. 93 of 1992), except for the matters mentioned in paragraph 3(a), is fair in all material respects and, where applicable, on a basis consistent with that of the preceding year.

2.2 Compliance: The Council's functions are determined by the Nuclear Energy Act, 1993 (Act No. 131 of 1993), and as a listed public entity it is subject to the provisions of the Reporting by Public Entities Act, 1992 (Act No. 93 of 1992). Compliance with this and other appropriate legislation was audited on a test basis.

3. AUDIT OBSERVATION:

Except for the matters discussed in paragraph (a) below, in my opinion:

- ☞ the transactions of the Council that came to my notice in the course of my examination were made in accordance with the applicable laws and instructions; and
- ☞ the transactions that came to my attention during auditing were in all material aspects in accordance with the mandatory functions of the Council as determined by law or otherwise.

(a) Reporting by Public Entities Act, 1992 (Act No. 93 of 1992): Director's Report: Although, in general, the Director's Report contains the information as required by section 7 of the Reporting by Public Entities Act, 1992 (Act No. 93 of 1992), only the more quantifiable objectives and key performance areas have been

taken up in the report. During the year under review the Council took further steps to establish the necessary information systems in order to comply fully with the Act in question.

4. APPRECIATION:

The courtesy extended, and assistance rendered, by the staff of the Council during the audit is greatly appreciated.

Pretoria, 02/10/97.



JCL Hughes.

for Auditor-General

Convention

Design and construction:

"each Contracting Party shall take the appropriate steps to ensure that: the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface"

VERSLAG VAN DIE OUDITEUR-GENERAAL

oor die finansiële jaarstate van die Raad vir Kernveiligheid vir die boekjaar geëndig 31 Maart 1997.

1. OUDITOPDRAG:

Die rekenings en die finansiële jaarstate van die Raad uiteengesit op State 1 tot 3 en die Aantekeninge daarby is ingevolge die bepalings van artikel 3 van die Wet op die Ouditeur-generaal, 1995 (Wet No. 12 van 1995), gelees met artikel 49(4) van die Wet op Kernenergie, 1993 (Wet No. 131 van 1993), geouditeer. Hierdie finansiële jaarstate en die instandhouding van doeltreffende beheermaatreëls is die verantwoordelikheid van die Raad se Uitvoerende Beampte. Dit is my verantwoordelikheid om oor hierdie finansiële jaarstate en die aangeleenthede in eersgenoemde Wet uiteengesit, verslag te doen.

2. REËLMATIGHEIDS- AUDITERING

2.1 Finansiël

2.1.1 Aard en omvang: Die ouditering is ooreenkomstig algemeen aanvaarde owerheids-ouditstandaarde uitgevoer. Hierdie standaard vereis dat die ouditering beplan en onderneem word om redelik sekerheid te verkry dat billike aanbieding in alle weselike opsigte in die finansiële jaarstate bereik is. 'n Ouditering behels 'n evaluering van die geskiktheid van die rekenkundige beleid, 'n ondersoek op 'n toetsgrondslag, van die bewyse wat die bedrae en openbaarmakings wat in die finansiële jaarstate ingesluit is, steun, 'n beoordeling van die redelikheid van beduidende voorsienings en 'n ooreweging van die geskiktheid van die algehele aanbieding van die jaarstate. Ek glo dat die auditprosedures in die omstandighede geskik was om die mening, wat hieronder aangebied

word, uit te spreek.

2.1.2 Ouditmening: Na my mening verstrek hierdie finansiële jaarstate 'n redelike weergawe van die finansiële stand van en die resultate verkry deur die Raad op 31 Maart 1996 in ooreenstemming met die algemeen aanvaarde rekeningkundige praktyk, toegepas op 'n grondslag in ooreenstemming met die van die vorige jaar. Voorts is die inligting verstrek ingevolge artikels 6 en 7 van die Wet op Verslagdoening deur Openbare Entiteite, 1992 (Wet No. 93 van 1992), met uitsondering van die aspekte vermeld in paragraaf 3(a), na my mening in alle weselike opsigte redelik en, waar van toepassing, op 'n grondslag in ooreenstemming met die van die voorafgaande jaar.

2.2 Nakoming: Die funksies van die Raad word deur die Wet op Kernveiligheid, 1993 (Wet No. 131 van 1993) bepaal, en as 'n gelyste openbare entiteit is dit onderhewig aan die bepalings van die Wet op Verslagdoening deur Openbare Entiteite, 1992 (Wet No. 93 van 1992). Nakoming van hierdie en ander toepaslike wetgewing is op 'n toetsgrondslag geouditeer.

3. OUDITWAARNEMING

Na my mening, behalwe vir die aangeleenthede wat in paragraaf (a) hieronder bespreek word:

- ☞ het die transaksies van die Raad wat tydens die ondersoek onder my aandag gekom het, ooreenkomstig die toepaslike wette en voorskrifte geskied; en
- ☞ was die transaksies wat tydens die ouditering onder my aandag gekom het, in alle weselike opsigte ooreenkomstig die by Wet of andersins bepaalde verpligte werksaamhede van die Raad.

(a) Wet op Verslagdoening deur Openbare Entiteite, 1992 (Wet No. 93 van 1992):

Contention

Operation:

"each Contracting Party shall take the appropriate steps to ensure that: operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures"

Direkteursverslag: Ofskoon die Direkteursverslag in die algemeen die inligting, soos vereis deur artikel 7 van die Wet op Verslagdoening deur Openbare Entiteite, 1992 (Wet No. 93 van 1992), bevat is slegs die meer kwantifiseerbare doelwitte en kernprestasië-areas in die verslag opgeneem. Gedurende die verslagjaar het die Raad verdere stappe geneem om die nodige inligtingstelsels daar te stel ten einde ten volle aan die betrokke Wet te voldoen.

4. WAARDERING:

Graag word waardering betuig vir die hoflikheid betoon en bystand verleen deur die Raad se personeel tydens die audit.

Pretoria, 02/10/97.



JCL Hughes.

namens Ouditeur-Generaal

Convention

Operation:

"each Contracting Party shall take the appropriate steps to ensure that procedures are established for responding to anticipated operational occurrences and to accidents"

Council for Nuclear Safety
(Section 33 of Act No. 131 of 1993)

Raad vir Kernveiligheid
(Artikel 33 van Wet No. 131 van 1993)

Statement/Staat 1**Balance sheet as at 31 March 1997 • Balansstaat soos op 31 Maart 1997**

	1996-97	Notes	1995-96	
	R	Aant.	R	
Capital employed				Kapitaal aangewend
Income funds	11 941 372		8 499 967	Inkomstefondse
Long-term liability	41 004	2	65 606	Langtermynlas
	11 982 376		8 565 573	
Employment of capital				Aanwending van kapitaal
Fixed assets	1 350 610	3	1 224 933	Vaste bates
Net current assets	10 631 766		7 340 640	Netto bedryfsbates
Current assets	12 733 388		9 232 057	Bedryfsbates
Debtors	3 754 788	4	3 476 747	Debiteure
Payments made in advance	127 692		184 055	Vooruitbetalings gemaak
Deposits and immediately claimable amounts	2 000		2 000	Deposito's en onmiddellik opeisbare bedrae
Bank balance and cash	8 848 908	5	5 569 255	Banksaldo en kontant
Less:				Min:
Current liabilities	2 101 622		1 891 417	Bedryfslaste
Creditors and provisions	2 077 020	6	1 866 814	Krediteure en voorsienings
Short-term loan	24 602	2	24 603	Korttermynlening
	11 982 376		8 565 573	

Centurion, 28/07/97

B.C. Winkler
B.C. Winkler,
Executive Officer,
Uitvoerende Beampete.

J.B. Martin
J.B. Martin,
Chairperson,
Voorsitter.

Income statement for the year ended 31 March 1997
Inkomstestaat vir die jaar geëindig 31 Maart 1997

	1996-97	Notes Aant.	1995-96	
	R		R	
Income funds				Inkomstefondse
- beginning of the year	8 499 967		6 134 751	- begin van die jaar
Operating surplus	3 441 405	7	2 365 216	Bedryfsurplus
Income funds				Inkomstefondse
- end of the year	11 941 372		8 499 967	- einde van die jaar

Cash flow statement for the year ended 31 March 1997

Kontantvloeistaat vir die jaar geëindig 31 Maart 1997

	1996-97 R	Notes Aant.	1995-96 R	
Cash (retained from) operating activities	(4 085 838)		(1 914 316)	Kontant (teruggehou uit) bedryfsaktiwiteite
Cash (surplus)/deficit generated from operations	(3 003 624)	A	(2 514 335)	Kontant (surplus)/tekort deur bedrywighede voortgebring
Income from interest	(1 093 687)		(480 237)	Rente-inkomste
Employed to increase/ (decrease) operating capital	11 473	B	(1 080 256)	Aangewend om bedryfskapitaal te verhoog/(verminder)
Cash utilised in investment activities	781 583		216 500	Kontant aangewend in beleggingsaktiwiteite
Investment to maintain operations:				Belegging om bedrywighede te handhaaf:
Additions to fixed assets	783 034	C	250 602	Toevoegings tot vaste bates
Proceeds from sale of fixed assets	(1 451)	D	(34 102)	Opbrengs uit die verkoop van vaste bates
	(3 304 255)		(1 697 816)	
Cash effects of financing activities				Kontantgevolge van finansieringsaktiwiteite
Increase/(decrease) in cash on hand	3 279 653		(1 673 213)	Toename/(afname) in kontant voorhande
Decrease/(increase) in long term liabilities	24 602		24 603	Afname/(toename) in langtermynlaste
Net movement of cash	3 304 255		1 697 816	Netto vloei van kontant

Notes to the cash flow statement Aantekeninge by die kontantvloeistaat

	1996-97 R	1995-96 R	
A) Cash surplus/(deficit) generated from operations			A) Kontantsurplus/(tekort) deur bedrywighede voortgebring
Surplus/(deficit) for the year	3 441 405	2 365 216	Surplus/(tekort) vir die jaar
Income over expenditure before finance cost	3 429 852	2 359 366	Inkomste bo uitgawe voor finansieringskoste
Finance cost	11 553	5 850	Finansieringskoste
Adjustment for:			Aansuiwering vir:
Depreciation	656 211	525 189	Depresiasie
Adjustment to fixed assets	-	105 865*	Verstelling aan vaste bates
Net profit on sale of obsolete assets	(305)	(1 698)	Netto wins op verkoop van uitgediende bates
Income interest	(1 093 687)	(480 237)	Rente-inkomste
	3 003 624	2 514 335	
B) Employed to increase operating capital			B) Aangewend om bedryfskapitaal te verhoog
Increase/(decrease) in debtors	278 041	497 385	Toename/(afname) in debiteure
Increase/(decrease) in payments made in advance	(56 363)	184 055	Toename/(afname) in vooruitbetalings gemaak
Increase/(decrease) in creditors	(210 206)	398 817	Toename/(afname) in krediteure
Increase/(decrease) in short-term loan	1	(1)	Toename/(afname) in korttermynlening
	11 473	1 080 256	
C) Additions to fixed assets			C) Toevoegings tot vaste bates
Computer equipment	623 108	151 414	Rekenaartoerusting
Scientific and technical equipment	52 014	779	Wetenskaplike en tegniese toerusting
Furniture	50 010	14 298	Meubels
Office equipment	57 902	84 111	Kantoortoerusting
	783 034	250 602	
D) Proceeds from sale of fixed assets			D) Opbrengs van die verkoop van vaste bates
Cost price	34 075	435 523	Kosprys
Accumulated depreciation	(32 929)	(403 119)	Opgehoopde depresiasie
Net book value	1 146	32 404	Netto boekwaarde
Net profit on disposal	305	1 698	Netto wins op wegdoening
	1 451	34 102	
* As a result of the reclassification of assets			* As gevolg van die herklassifisering van bates

Notes to the financial statements

Aantekeninge by die finansiële state

	1996-97 R	1995-96 R	
<p>1. Accounting policy</p> <p>The financial statements are compiled on the historical cost basis in accordance with the undermentioned policies, which were applied consistently in every material respect except where otherwise stated.</p> <p>1.1 Income acknowledgement in general</p> <p>Income is recognised on the accrual basis.</p> <p>1.2 State contributions received</p> <p>State contributions are accounted for in the period with which the allocation is associated.</p> <p>1.3 Fixed assets and depreciation</p> <p>Fixed assets are shown at cost less accumulated depreciation and are written off over the expected useful life according to the fixed instalment method.</p> <p>Expected useful life of office furniture is ten years, computer equipment three years, and scientific and technical equipment and office equipment five years.</p> <p>1.4 Expenditure for research and development</p> <p>These expenditures are written off in the Income Statement in the year in which they were incurred.</p>			<p>1. Rekeningkundige beleid</p> <p>Die finansiële state is op die historiese kostegronslag opgestel ingevolge onderstaande beleid wat in alle wesenlike opsigte konsekwent toegepas is tensy anders aangetoon.</p> <p>1.1 Inkomste-erkenning in die algemeen</p> <p>Inkomste word ooreenkomstig die toevallingsgronslag erken.</p> <p>1.2 Staatstoekennings ontvang</p> <p>Staatstoekennings word verantwoord in die tydperk waarop die toekenning betrekking het.</p> <p>1.3 Vaste bates en depresiasie</p> <p>Vaste bates word getoon teen kosprys min opgehoopte depresiasie en word oor die verwagte nutsduur volgens die vastepaaiement-metode afgeskryf.</p> <p>Verwagte lewensduur van kantoormeubels is tien jaar, rekenaartoerusting drie jaar, en wetenskaplike- en tegniese toerusting en kantoor-toerusting vyf jaar.</p> <p>1.4 Uitgawe vir navorsing en ontwikkeling</p> <p>Hierdie uitgawes word in die Inkomstestaat afgeskryf in die jaar waarin dit aangegaan is.</p>

Schedule/Bylae B
(Continued/vervolg)

	1996-97 R	1995-96 R	
1.5 Leased assets			1.5 Gehuurde bates
Assets acquired under finance lease agreements are capitalised.			Bates verkry deur middel van finansieringshuurooreenkomste word gekapitaliseer.
Lease rentals are in respect of operating leases and are debited against income as incurred.			Huurgelde is ten opsigte van bedryfshuurooreenkomste en is soos aangegaan teen inkomste gedebiteer.
2. Long-term liability			2. Langtermynlas
Liability under a capitalised finance lease repayable over the period 1 December 1994 to 30 November 1999, at an effective interest rate of 20,4% (1996: 19,25%) per annum and repayable in monthly instalments of R3012 (1996: R2538) (Exl. VAT)	65 606	90 209	Las onder 'n gekapitaliseerde finansieringshuurkontrak terugbetaalbaar oor die periode 1 Des.1994 tot 30 Nov. 1999, teen 'n effektiewe rentekoers van 20,4% (1996: 19,25%) per jaar en terugbetaalbaar in maandelikse paaiemente van R3012 (1996: R2538) (BTW uitgesluit).
Less: Payable in ensuing year included under current liabilities.	24 602	24 603	Min: Betaalbaar in die daaropvolgende jaar onder bedryfslaste.
	41 004	65 606	

Schedule/Bylae B
(Continued/vervolg)

3. Fixed assets/Waste bates

	Furniture/ Meubels	Computer equipment/ Rekenaar- toerusting	Scientific & technical equipment/ Wetenskaplike- & tegniese toerusting	Office equipment/ Kantoor- toerusting	Total/ Totale
	R	R	R	R	R
Carrying amount at 31 March 1996/ Bedrag oorgedra soos op 31 Maart 1996	248 655	761 730	20 592	193 956	1 224 933
At cost/teen kosprys	362 498	2 859 934	1 991 865	293 118	5 507 415
Accumulated depreciation/ Opgehoopte depresiasie	(113 843)	(2 098 204)	(1 971 273)	(99 162)	(4 282 482)
Additions/Toevoegings	50 010	623 108	52 014	57 902	783 034
Disposals/Wegdoenings	(268)	0	(753)	(125)	(1 146)
Depreciation for the year/ Depresiasie vir die jaar	(38 285)	(544 331)	(11 111)	(62 484)	(656 211)
Carrying amount at 31 March 1997/ Bedrag oorgedra soos op 31 Maart 1997	260 112	840 507	60 742	189 249	1 350 610
At cost/teen kosprys	411 711	3 450 848	2 043 101	350 715	6 256 375
Accumulated depreciation/ Opgehoopte depresiasie	(151 599)	(2 610 341)	(1 982 359)	(161 466)	(4 905 765)

Schedule/Bylae B
(Continued/vervolg)

	1996-97 R	1995-96 R	
4. Debtors			4. Debiteure
Trade debtors	3 496 853	3 268 487	Handelsdebiteure
Less: Provision for bad debts	100 000	100 000	Min: Voorsiening vir oninbare skulde
Net trade debtors	3 396 853	3 168 487	Netto handelsdebiteure
Other debtors	357 935	308 260	Ander debiteure
	3 754 788	3 476 747	
5. Interest bearing current account at 16,00% (1996: 10,25%) per annum. Interest bearing fixed deposit account at 16,70%.			5. Rentedraende lopende rekening teen 16,00% (1996: 10,25%) per jaar. Rentedraende vaste deposito-rekening teen 16,70%.
6. Creditors			6. Krediteure
Trade creditors	701 883	658 714	Handelskrediteure
Other creditors	160 137	1 100	Ander krediteure
Provision for accumulated leave	1 115 000	1 107 000	Voorsiening vir opgehoopte verlof
Provision for audit fees	100 000	100 000	Voorsiening vir ouditgelde
	2 077 020	1 866 814	

Schedule/Bylae B
(Continued/vervolg)

7. Operating surplus (deficit)
before abnormal item

	1996-97	1995-96
	R	R
Income	26 615 421	22 956 620
State contribution	5 271 000	5 400 000
Licensing fees	19 943 783	16 614 740
Special services	277 856*	437 981*
Interest	1 093 687	480 237
Sundry	29 095	23 662
Less: Expenditure	23 174 016	20 591 404
Adjustment to fixed assets	-	105 865***
Audit fees	109 616	75 917
Provision for audit fees	100 000	100 000
(Over)/under provision		
previous year	9 616	(24 083)
Bad debts written of as		
irrecoverable	6 504	23 828
Computer software	254 385	318 552
Consultancy	274 776	308 450
Consumable stores	152 412	116 166
Depreciation	656 211	525 189
Net loss on disposal of		
obsolete assets	(305)	(1 698)
Finance cost	11 553	5 850
Insurance	116 853	108 022
Library items	93 201	132 330**
Operating leases	252 072	235 897
Personnel expenses	17 242 598	15 477 472**
Post-retirement benefit	158 668	95 036**
Postal and telephone services	330 993	280 047
Provision for accumulated leave	8 000	2 000
Rent, accommodation	947 683	803 961
Research contracts	93 314	110 264
Service contracts and		
maintenance	533 233	248 126
Stationary and printing	177 493	169 795
Subsistence and transport		
expenses	1 440 853	1 219 197
Sundry expenditure	313 903	231 138**
Operating surplus	3 441 405	2 365 216

7. Bedryfsurplus (tekort)
voor abnormale item

Inkomste
Staatsbydrae
Lisensiegelde
Spesiale dienste
Rente
Diverse
Min: uitgawe
Verstelling van vaste bates
Ouditgelde
Voorsiening vir ouditgelde
(Oor-) ondervoorsiening
vorige jaar
Skuld afgeskryf as
onverhaalbaar
Rekenaarprogramme
Konsultantdienste
Verbruikbare voorraad
Depresiasie
Netto verlies op wegdoening
van uitgediende bates
Finansieringskoste
Versekering
Biblioteek items
Bedryfshuurooreenkomste
Personeeluitgawes
Na aftrede voordeel
Pos- en telefoondienste
Voorsiening vir opgehoopte verlof
Huur, akkomodasie
Navorsingskontrakte
Dienskontrakte en
instandhouding
Skryfbehoeftes en drukwerk
Vervoer- en
verblyfuitgawes
Diverse uitgawes
Bedryfsurplus

**Schedule/Bylae B
(Continued/vervolg)**

	1996-97	1995-96	
	R	R	
* Radiological protection services rendered to organisations that are not licensees of the CNS			* Radiologiese beskermingsdienste gelewer aan instansies wat nie gelisensieerdes van die RKV is nie.
** Restated because of a change in disclosure policy			** Herbereken as gevolg van 'n verandering in openbaarmaking beleid
*** As a result of the reclassification of fixed assets			*** As gevolg van herklassifisering van vaste bates

8. Contingent liability

The intention of the Council was firstly to establish a fund for the pre-funding of medical subscription contributions for its pensioners who were in its employ prior to 1 July 1990 and for whom the Council has a liability.

For this purpose the Council has, over a two-year period, built up funds to the amount of R2 800 000.

The fund has not materialised since it did not receive the support of the Minister of Finance.

The Council has also set aside an amount of R340 000 for the purchase of office accommodation in the Western Cape.

Finalisation of this transaction awaits rezoning approval.

9. CNS Retirement Fund

All employees are members of the CNS

Retirement Fund, a defined benefit fund governed by the Pension Funds Act of 1956.

The Fund was established on 1 December 1994 following withdrawal by the CNS from the Associated Institutions Pension Fund.

The employer contribution rate is 20,61% of the employees' pensionable salaries, and the employees' contribution rate is 7,5% of pensionable salary for all employees.

A full actuarial valuation of the Fund was done in April 1996 and it was found that the funding level was 96,2%.

The Fund has been certified as sound, and an actuarial valuation will again be done within the prescribed period of three years from the date of the previous validation.

8. Voorwaardelike aanspreeklikheid

Die voorneme van die Raad was eerstens om 'n fonds te stig vir die vobruitbefondsing van mediese lidmaatskapsgeelde vir sy pensionarisse wat voor 1 Julie 1990 in die Raad se diens was en teenoor wie die Raad 'n verantwoordelikheid het.

Vir hierdie doel het die Raad, oor 'n twee jaar tydperk, fondse opgebou ten bedrae van R2 800 000.

Die fonds het nie gematerialiseer nie omdat dit nie die ondersteuning van die Minister van Finasies ontvang het nie.

Die Raad het ook 'n bedrag van R340 000 opsy gesit vir die aankoop van kantoor akkomodasie in die Wes-Kaap.

Finalisering van hierdie transaksie wag op hersonering goedkeuring.

9. RKV-Afreesfonds

Alle werknemers is lede van die RKV-Afreesfonds, 'n vaste voordeelfonds wat deur die Wet op Pensioenfondse van 1956 gereël word.

Die fonds is op 1 Desember 1994 gestig na onttrekking deur die RKV uit die Pensioenfonds vir Geassosieerde Inrigtings.

Die werkgewer se bydraekoers is 20,61% van die werknemers se pensioendraende salarisse, en die werknemers se bydraekoers is 7,5% van die pensioendraende salaris vir alle werknemers.

'n Volledige aktuariële waardering van die Fonds is in April 1996 gedoen en daar is bevind dat die befondsingsvlak 96,2% was. Die Fonds is as gesond gesertifiseer en 'n aktuariële waardering sal weer binne die voorgeskrewe tydperk van drie jaar vanaf die datum van die laaste waardering, gedoen word.

Convention

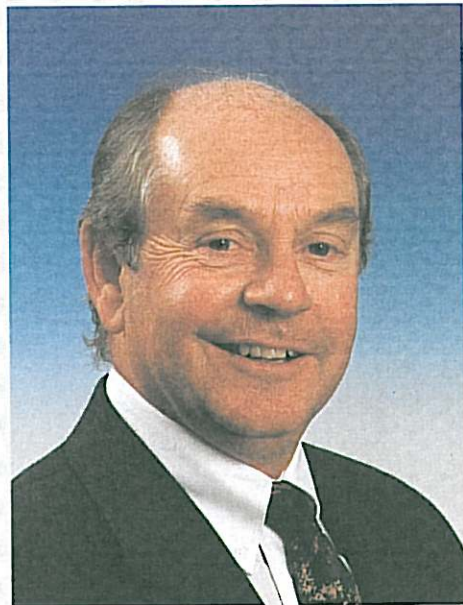
Operation:

"each Contracting Party shall take the appropriate steps to ensure that incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body"

Top- en Seniorbestuur • Top and Senior Management



Bert Winkler
Executive Officer
Uitvoerende Beampte



Jeff Leaver
General Manager
Hoofbestuurder



Sam Parish
Senior Manager:
Licensing Projects
Senior Bestuurder:
Lisensiëringsprojekte



Phil Metcalf
Senior Manager:
Scientific, Engineering and
Technical Services
Senior Bestuurder:
Wetenskaplike, Ingenieurs- en
Tegniese Dienste

