



AUSTRALIAN RADIATION PROTECTION AND NUCLEAR SAFETY AGENCY

**FIRST QUARTERLY REPORT
OF THE
CHIEF EXECUTIVE OFFICER**

FOR THE PERIOD 5 FEBRUARY TO 31 MARCH 1999

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1. FOREWORD

The object of the *Australian Radiation Protection and Nuclear Safety (ARPANS) Act 1998* is to protect the health and safety of people, and to protect the environment, from the harmful effects of radiation. The Act came into force on 5 February 1999. It is administered and enforced by a statutory office holder, the Chief Executive Officer (CEO) of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). ARPANSA incorporates the Australian Radiation Laboratory, formerly part of the Department of Health and Aged Care, and the Nuclear Safety Bureau, a statutory authority.

The ARPANS Act provides a licensing framework for the regulation of radiation sources and nuclear and other facilities controlled or operated by Commonwealth agencies. It establishes the functions of the CEO of ARPANSA which are to:

- promote uniformity of radiation protection and nuclear safety policy and practices across jurisdictions of the Commonwealth, the States and the Territories;
- provide advice on radiation protection, nuclear safety and related issues;
- undertake research in relation to radiation protection, nuclear safety and medical exposures to radiation;
- provide services relating to radiation protection, nuclear safety and medical exposures to radiation;
- accredit persons with technical expertise for the purposes of the Act;
- monitor and report on the operations of ARPANSA, the Radiation Health and Safety Advisory Council, the Radiation Health Committee and the Nuclear Safety Committee; and
- monitor compliance with the prohibitions set out in the Act and make recommendations to the Director of Public Prosecutions (DPP).

Commonwealth agencies involved in activities covered by the ARPANS legislation will be required to submit applications for licence. Non-Commonwealth agencies are regulated by applicable State or Territory radiation protection and environment legislation.

The ARPANS Regulations, which came into force on 17 March 1999, provide more detail as to what is required to be licensed; what is exempt from regulation; how licence applications should be made; matters the CEO must take into account when making decisions; licence conditions; and practices to be followed.

The ARPANS Act requires the CEO each quarter to prepare and give to the Minister of Health and Aged Care a report on the operations during the quarter of the CEO, ARPANSA, the Council and committees. This is the first such report and covers the period 5 February to 31 March 1999. The Act requires that the report include:

- details of directions given by the Minister to the CEO during the quarter under section 16 of the Act;
- details of any breach of licence conditions by a licensee during the quarter, of which the CEO is aware;
- details of all reports received by the CEO during the quarter from the Council or the Nuclear Safety Committee; and
- a list of all facilities licensed under Part 5 of the Act during the quarter.

The Minister must arrange for the tabling of the quarterly report in each House of the Parliament within 15 sitting days of receipt of the report.

The Nuclear Safety Bureau's forty-fifth quarterly report to the Minister covers the period 1 October 1998 to 4 February 1999. This report outlines performance in regard to the former Bureau's powers to monitor and review the safety of nuclear plant owned and operated by the Australian Nuclear Science and Technology Organisation (ANSTO), to provide technical advice on the safety of nuclear plant and related matters, and other determined functions.

Organisational Direction

Following consultation with stakeholders, an ARPANSA Corporate Plan 1998/99-2001/02 has been developed which incorporates the following statement of what we are striving to make ARPANSA become over the next 3-5 years:

The leading organisation in Australia for scientific excellence and practical expertise in radiation protection and nuclear safety and a highly effective and efficient regulator of Commonwealth entities.

ARPANSA's mission is to provide the scientific expertise and infrastructure necessary to support the objective of the ARPANS Act – to protect the health and safety of people, and to protect the environment, from the harmful effects of radiation.

A corporate planning framework has been developed to implement the strategies contained in the Corporate Plan and to better manage organisational performance. The purpose of the framework is to integrate planning across the Agency, increase accountability to the community and the Parliament, and facilitate a shared sense of direction and focus to ARPANSA's work.

2. REPORT ON PERFORMANCE

(a) ISSUES ARISING DURING TRANSITION PERIOD

The ARPANS Act came into force on 5 February 1999 and the ARPANS Regulations on 17 March 1999. The ARPANS Act has a 6 months transition period (until 5 August 1999) during which time Commonwealth agencies have to apply for licences to enable them to deal with (ie possess, have control of, use, operate, or dispose of) radiation sources.

Maralinga Incident

The Commonwealth Government, through the Department of Industry, Science and Resources (DISR), is currently undertaking rehabilitation works at the former British nuclear test site at Maralinga. The rehabilitation works are designed to reduce the level of contamination at the site. It is expected that the rehabilitation works will be completed by June 2000.

ARPANSA provides advice to DISR on the radiation health aspects of the Maralinga clean up. DISR is responsible for the Maralinga rehabilitation project and is to apply for a facility licence for the treatment of the burial pits.

Following attempts by the British to clean-up the Maralinga atomic weapons test range in the 1960's, 21 burial pits were left at the Taranaki site containing large amounts of debris, including contaminated steel plates, barytes and lead bricks, soil and an amount of plutonium currently estimated to be of the order of 100 g per pit. As one way to render these pits safe for future occupiers of the land, a process known as in situ vitrification (ISV), which converts contaminated pit contents into a monolithic solid, has been used.

On 21 March 1999, a sudden release of gases occurred during the final stages of the treatment of Pit 17 at Taranaki by the ISV process. The cause of the event is unknown at this stage, but it was probably due to the creation of a large quantity of gas at the bottom of the melt. This resulted in the ejection of large quantities of gas and molten material that, in turn, resulted in the panels of the hood-structure falling in on the pit and a fire on top of the hood structure. Suggested causes for the incident include the melt striking ground water or organic materials at the bottom of the pit, heating a gas cylinder containing acetylene or oxygen, or the detonation of explosives. Ongoing investigations may help to discover the cause.

The radiological implications of the incident were minor with no exposures to personnel or spread of contamination outside controlled areas. Any radioactive material was incorporated in the melt phase and most of the melt material was contained within the hood. Some molten material flowed over the base of the hood for approximately one metre and glass beads (formed when the melt material cooled) were ejected tens of metres beyond the hood. Most of the ejected material stayed within the exclusion zone around the hood and did not go further than 20 metres but small quantities were ejected 50 to 70 metres in a north-easterly direction. These contaminated glass beads are easily

removed leaving no residual contamination in the soil. This material does not present a radiological hazard. Area monitoring carried out after the event indicates that the radioactive components of the pit were incorporated in the melt phase, and that nearly all of the melt material remained within the equipment hood and its immediate vicinity.

An event of this magnitude was not anticipated by ARPANSA. The possibility of minor gas eruptions through the melt was well appreciated before the incident and the process had accordingly been designed to cope with such events. Experience with the melts to the time of the incident had suggested that the design controls implemented at site to deal with eruptions of gases in the melt were appropriate. Precautions in place included the presence of a containment hood and implementation of an exclusion zone.

The concentration of plutonium in the ISV melt at Pit 17 is unknown but can be estimated, on the basis of previous melts, to be less than 100 g in 400 tonne, or less than 0.000025%. Quantities of other radioactive materials, or of any combustible material, are unknown. The plutonium, present in the pits as oxide, is not combustible.

ARPANSA has been informed that air samplers were present around the equipment, including down-wind from the incident. These did not record any airborne contamination. Wind was from the south-east (5 – 8 kph at 1 p.m.).

Government and other stakeholders, including ARPANSA, the South Australian Premier's Department, the occupational health and safety inspectorate in the South Australian Department of Administrative and Information Services, the Radiation Protection Branch of the South Australian Health Commission, and Maralinga Tjarutja traditional owners were advised of the incident by DISR. A press release on the incident was issued by the Project Manager (Gutteridge Haskins & Davey) on 25 March 1999.

DISR has ordered a thorough investigation of the incident by the project managers, which will then be independently audited.

ARPANSA is monitoring the radiation safety aspects of the Maralinga clean-up, both for workers involved and also the environmental and public health outcomes of the operation and senior staff of ARPANSA are providing independent, expert oversight of radiological aspects of the investigation. At this stage, ARPANSA has ascertained that no staff were present within the exclusion zone at the time of the incident and there were no off-site consequences or any long-term implications for the radiological status of the site.

While no worker was hurt or exposed to radiation in the incident, the incident was nevertheless a serious accident from an occupational health and safety perspective because of the potential physical harm it could have caused to personnel, rather than from its radiological impact.

Lucas Heights Incidents

Four incidents at the Lucas Heights Science and Technology Centre run by the Australian Nuclear Science and Technology Organisation (ANSTO), have recently been reported in the media and discussed at the Senate Inquiry hearings at Sutherland, NSW on 14 April 1999. One incident did not involve radiation (the release of water into the Woronora River), while the others were not serious incidents in the sense of causing significant exposures of workers or the public to radiation. These incidents occurred at facilities that are not yet regulated by ARPANSA. Under the ARPANS Act ANSTO has until 5 August 1999 to apply for facility licences.

However, the three incidents are being fully investigated by both ANSTO and ARPANSA to determine their root causes and to establish improvements which will help to ensure that such incidents do not recur.

Fuel Handling Incident, February 1999

On 1 February 1999, a spent fuel element was being transferred by a group of four operators from ANSTO's spent fuel storage area to an examination area. As part of this process, fuel elements are placed over a drip tray to ensure that any water adhering is collected. This involves raising the shielding transport flask containing the element some 20cm above the tray. On this occasion, when this was done some 20cm of the 60cm element was seen to be protruding from the bottom of the flask. The operators lowered the flask to shield personnel from radiation. ANSTO reported that the maximum dose to any person near the flask was less than 0.5 millisievert, which is 1/40th (2.5%) of the annual occupational dose limit recommended by the National Health and Medical Research Council (NHMRC) for radiation workers. There were no impacts outside the building.

ARPANSA was promptly advised of this incident. On 19 February 1999, the CEO wrote to the Executive Director, ANSTO seeking a detailed report on the incident in the context of overall fuel handling arrangements and advising that recovery procedures should be approved by ARPANSA before recovery was attempted. On 10 March 1999, the Executive Director responded seeking ARPANSA's approvals for and comments on actions proposed and indicating that a detailed report on fuel handling incidents was being prepared. That letter also advised that a new position of Manager, Fuel is to be created to ensure clarity in the lines of responsibility for fuel movements. ARPANSA strongly supports this step being taken.

An ARPANSA officer witnessed the successful recovery operation on 14 April 1999. ANSTO will report to ARPANSA on the root causes of the incident and proposed actions to prevent its recurrence, and on the results of inspections of the fuel element involved.

Releases of Radioactive Gases, February 1999

These two events concerned medical radiopharmaceutical production, which involves processing a number of isotopes in various buildings round the ANSTO site. ANSTO reported that during February there were two occasions when releases above routine levels required nuclear medicine production to be shut down. One involved a release of the inert noble gases, xenon and krypton, and the other, iodine. Calculations by ANSTO indicated that there were no significant exposures to personnel or the public resulting from these releases. This was confirmed by ARPANSA's own calculations.

Both incidents are still being investigated by ANSTO and detailed reports on root causes and corrective actions will be sent to ARPANSA. In the meantime, officers of ARPANSA visited the sites of the incidents, interviewed ANSTO staff and reviewed corrective actions to date. It appears that the release of noble gases was due to a failure of an operator to check the position of a valve and was terminated promptly by the operator after an alarm on the discharge stack sounded. The ARPANSA officers noted revisions made to procedures to ensure that this does not reoccur.

In the case of the iodine release, ANSTO believes that a filter on a hot cell failed, releasing increased quantities of radioactive iodine gas to the environment. The filter has been replaced, and will be inspected when the radioactivity trapped on the filter has decayed to acceptable levels. The ARPANSA officers viewed new detectors and alarms fitted to the isotope production process to ensure that any similar incidents are immediately detected and rectified. Procedures have been developed to ensure any alarms are investigated and immediate actions taken to limit any abnormal release of radioactive materials.

(b) DIRECTIONS BY THE MINISTER

The CEO of ARPANSA is required to report details of directions given by the Minister to the CEO during the quarter under section 16 of the ARPANS Act. No such directions were given.

(c) REGULATION

During the 6 months transition period ARPANSA staff are consulting with stakeholders and establishing a licensing framework. In March 1999 ARPANSA released the Guide to the Australian Radiation Protection and Nuclear Safety Licensing Framework, and source and facility licence application packs.

At 31 March, no licence applications have been received.

It is expected that approximately 20 'nuclear installation' licence applications and 25 'prescribed radiation facility' applications will be received by ARPANSA. The numbers of radiation source licence applications to be received is not yet known.

Safety of ANSTO Nuclear Plant

The *Australian Nuclear Science and Technology Organisation Amendment Act 1992* established the Nuclear Safety Bureau (NSB) with functions including the review and safety of ANSTO's nuclear plant. This part of the Act was repealed with the proclamation of the ARPANS Act. However, in the period prior to a decision being made on an application for licence for these facilities, the CEO of ARPANSA has functions and powers to enable the safety review formerly performed by the NSB to be continued by ARPANSA.

ARPANSA reviewed all reported abnormal occurrences at ANSTO's nuclear plant and it was concluded that none had adverse safety implications. ARPANSA continued to assign levels on the International Nuclear Event Scale¹ (INES) to these abnormal occurrences, on a trial basis. Accordingly, all occurrences were assigned Level 0, ie. of no safety significance.

Radioactive airborne discharges from the High Flux Australian Reactor (HIFAR) were reviewed by ARPANSA for compliance with the airborne discharge authorisation issued by the NSB. All levels of discharges were less than the notification levels specified in the authorisation. ANSTO is yet to report on the calculated doses to the public arising from the discharges for the quarter. Liquid discharges from the Lucas Heights Science and Technology Centre were reviewed for compliance with the Trade Waste Agreement between Sydney Water and ANSTO, which includes limits in the concentrations of radioactive materials at the discharge point and at the Cronulla Sewerage Treatment Plant. The liquid discharges for the last quarter 1998 were in compliance with the Trade Waste Agreement.

As part of the ongoing review of safety at HIFAR, ARPANSA reviewed the progress of modifications to the reactor and conducted an audit of HIFAR maintenance. The audit was based on the safety guides and auditing techniques of the International Atomic Energy Agency. A report on the audit is being finalised.

On 30 March 1999, the Minister for the Environment, Senator Hill, concluded that there were no environmental reasons why the proposed replacement research reactor should not proceed, subject to 29 recommendations, a number of which involve actions by ARPANSA. ARPANSA will consider the recommendations when assessing applications by ANSTO to site, construct, operate and decommission the proposed reactor.

¹ In 1992 the International Atomic Energy Agency (IAEA), in conjunction with the Nuclear Energy Agency (NEA) of the OECD, invited the formal adoption of the International Nuclear Event Scale (INES) for power reactors. Also, they invited the trial use of the Scale for other types of nuclear installations. In 1995 the period for the trial use of the Scale for other types of installations ended with the recommendation that INES be adopted for all civilian nuclear installations, including research reactors. The primary purpose of the INES is to facilitate communication between the nuclear community, the media and the public, in relation to such events. The INES runs from Level 0, for events of no safety significance, to Level 7 for major accidents, eg. the Chernobyl accident.

(d) COUNCIL AND COMMITTEE OPERATIONS

The ARPANS Act establishes the Radiation Health and Safety Advisory Council with members to include State and Territory radiation control officers, relevant scientific and technical experts and people representing the interests of the public.

The Council's key functions are, in relation to radiation protection and nuclear safety matters, identify and advise the CEO of emerging issues, examine matters of major concern to the community, and advise the CEO on the adoption of recommendations, policies, codes of practice and standards and on any other matters identified by the CEO or the Council.

The Act establishes two supporting committees. The Radiation Health Committee will advise the CEO and the Council on radiation protection and will develop policies and prepare draft publications for the promotion of uniform national standards of radiation protection in consultation with the public.

The Nuclear Safety Committee will advise the CEO and the Council on matters relating to nuclear safety and the safety of controlled facilities, and in relation to the safety of controlled facilities, review and assess the effectiveness of standards, codes of practice and procedures and develop policies and publications for the promotion of uniform national standards.

The process of establishing the Council and committees is under way. The appointments are expected to be finalised in the April-June quarter.

Therefore, at 31 March 1999, the CEO has received no reports from Council.

(e) INTERNATIONAL LIAISON

There were no significant international liaison issues during the reporting period.

(f) UNIFORMITY OF RADIATION PROTECTION FRAMEWORKS

Work has been progressed in the development and implementation of a uniform national framework for radiation protection during and prior to the quarter. The agreed approach to progressing national uniformity centres on the Radiation Health Committee, established under the ARPANS Act, developing a National Directory for Radiation Protection.

It is proposed that the National Directory provide an overall agreed framework for radiation safety, including both ionising and non-ionising radiation, together with clear regulatory statements that are able to be adopted within existing Commonwealth and State/Territory legislative frameworks.

A submission on the proposed uniformity process has been forwarded to the Australian Health Ministers Advisory Council (AHMAC) for consideration. It is proposed that the Radiation Health Committee will regularly report to AHMAC and Ministers on the likely impact of new provisions developed for the National Directory. AHMAC and Ministers will then have the opportunity to consider the appropriateness of those provisions.

(g) OTHER HIGHLIGHTS

National Competition Principles Review

Following a recommendation by the COAG Senior Official's Meeting, a proposal has been developed for a National Competition Principles Review of radiation control legislation in all Australian jurisdictions. It is intended that this review, which would examine restrictions on competition contained in all radiation control acts, would be supervised by the National Uniformity Implementation Panel (Radiation Control), or NUIP(RC). The NUIP(RC) includes representatives of all States, Territories and the Commonwealth. The COAG Committee on Regulatory Reform has forwarded the proposal to the Australian Health Ministers' Council for consideration and endorsement.

Nuclear Powered Warship Reference Accident

The ARPANSA Regulatory Branch is drafting a revised reference accident for the Visiting Ships Panel (Nuclear), which will be used in the assessment of the suitability of ports for visits by nuclear powered warships. This work took into consideration relevant advances in accident modelling, new information on nuclear accidents and discussions held with representatives of the States and Territories. The draft is in its final stages.

John Loy
CEO
3 May 1999