



**FORTY-FIFTH QUARTERLY REPORT  
OF THE NUCLEAR SAFETY BUREAU  
for the period  
1 OCTOBER 1998 TO 4 FEBRUARY 1999**

Nuclear Safety Bureau  
April 1999



## INTRODUCTION

The Nuclear Safety Bureau (NSB) was established and operated under Part VIIA of the *Australian Nuclear Science and Technology Organisation (ANSTO) Act 1987*, as amended in 1992. The NSB's functions under the Act were specified in subsection 37A.(1). These functions were:

- (a) to monitor and review the safety of any nuclear plant<sup>1</sup> owned or operated by ANSTO;
- (b) to provide technical advice to the Commonwealth on the safety of nuclear plant and related matters; and
- (c) such other functions as the Minister determined in writing.

The NSB authorised the operation of ANSTO's nuclear reactors, under Section 37A.(1)(a) of the Act, and monitored the safety of operations against arrangements in the Authorisations. Under Section 37A.(1)(b) of the Act, the NSB provided advice to the Commonwealth on international nuclear safety issues as well as other relevant issues.

As part of its other functions under Section 37A.(1)(c) of the Act, the NSB worked on nuclear safety issues together with other Government departments and agencies. Specifically, these were contributions by the NSB to technical work associated with the *Environment Protection (Nuclear Codes) Act 1978*, and participation in the activities of the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) of the OECD with regard to nuclear regulatory and safety issues.

The *Australian Nuclear Science and Technology Organisation Amendment Act 1992* provided the NSB with statutory independence from ANSTO and with the authority to place conditions or restrictions on the operation of ANSTO's nuclear plant (Section 37C.), with which ANSTO had to comply.

Section 37U.(1) enabled the NSB to submit to the Minister such reports as it considered appropriate. In addition, Section 37U.(2) of the Act required the NSB to submit to the Minister such reports relating to the performance of its functions as the Minister directed. A Ministerial Direction of 11 September 1992, required the NSB to provide the Minister with a report, each three months, on matters related to the performance of its functions.

The responsibility for the administration of Part VIIA of the legislation, which established the NSB, rested with the Minister for Health.

This is the final Quarterly Report of the NSB, the functions and resources of which have been subsumed by the Chief Executive Officer and Regulatory Branch of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) upon proclamation of ARPANS Act on 5 February 1999. This report covers the period 1 October 1998 to 4 February 1999.

---

<sup>1</sup>

Nuclear plant owned and operated by ANSTO is defined as nuclear reactors and 'associated plant'. By agreement with ANSTO, 'associated plant' now includes spent nuclear fuel and fissile materials storage at the Lucas Heights Science and Technology Centre.

## FUNCTIONS

### SAFETY OF NUCLEAR PLANT OPERATED BY ANSTO

This section of the report is a summary based largely on a detailed report in the NSB document "Safety of Operation of ANSTO's Nuclear Plant for the Period 1 October 1998 to 4 February 1999", NSB 1/1999, which covers the functions of the NSB under Section 37A.(1)(a) of the *ANSTO Amendment Act*. ANSTO's nuclear plant consists of the research reactors HIFAR<sup>2</sup> and Moata, and associated plant that includes spent nuclear fuel and fissile materials storage. HIFAR, designed to be a materials-testing reactor, commenced operation in 1958 and operates at a maximum thermal power of 10 megawatts. Moata is a university training reactor of the 'Argonaut' type that commenced operation in 1961 and operated at thermal powers up to 100 kilowatts until it was permanently closed down in 1995.

The Executive Director, ANSTO and the Chairman, Safety Review Committee (SRC) each received a copy of NSB 1/1999. The SRC is a body that reports on the safety of ANSTO's operations to the Minister for Industry, Science and Resources. In addition to providing the SRC with the report for the period, the NSB attended SRC meetings on a part-time basis to respond to queries the Committee may have on the safety of ANSTO's nuclear plant.

### HIFAR Operations

Seven Abnormal Occurrences were reported to the NSB for the period 1 October to 31 December 1998. These were reviewed by the NSB and it was concluded that none had adverse safety implications. Six Abnormal Occurrences were due to equipment fault while one was human factors related. The NSB continued to assign levels on the International Nuclear Event Scale<sup>3</sup> (INES) to HIFAR Abnormal Occurrences, on a trial basis. Accordingly, all occurrences were assigned Level 0, *i.e.* of no safety significance.

The INES is intended for application to incidents and accidents at nuclear power plants, research reactors, nuclear ships, irradiation facilities, uranium mining, nuclear fuel fabrication, fuel reprocessing and fuel storage. As a member of the INES Information Service, Australia will be informed of events at nuclear installations in other member countries, particularly those at INES Level 2 and above, and in return must notify the IAEA within 24 hours of any events at Australian nuclear installations which are at INES Level 2 and above.

---

<sup>2</sup> HIFAR is an acronym for the **HI**gh **F**lux **A**ustralian **R**eactor.

<sup>3</sup> 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, *e.g.* the Chernobyl accident.

Currently, ANSTO assigns INES levels to events at HIFAR and some other nuclear installations and submits these to the NSB. These are reviewed by the NSB and confirmed, or the level is revised and ANSTO notified.

The NSB monitors radiation protection at HIFAR through audits of operations as well as through reviews of procedures and the minutes of the Reactor Dose Reduction Working Party (RDRWP) and the Nuclear Technology Health and Safety Committee. The RDRWP meeting held in October 1998 noted that the collective effective radiation dose to HIFAR personnel for the first six months of 1998 was less than for the previous six-month period. As reported previously, the NSB is monitoring investigations into the increased ambient radiation levels on the reactor top. This and other issues will be discussed with ANSTO staff.

Notification levels specified in the airborne discharge authorisation for HIFAR ensure that the radiation doses to persons outside the ANSTO site, arising from authorised discharges, would be as low as reasonably achievable (ALARA) and extremely unlikely to exceed a small fraction of the dose limit recommended by the National Health and Medical Research Council (NHMRC). Correction levels are also included in the authorisation to ensure that immediate actions are taken at predetermined discharge levels corresponding to 10% of the NHMRC recommended limit.

The NSB has agreed to a change to the correction levels for argon-41 in the HIFAR Operational Limits and Conditions Radioactive Discharges, based on the use of a new agreed computer model to assess radioactive doses arising from airborne discharges. ANSTO reported that the amount of argon-41 discharged from the HIFAR active ventilation system from October to December 1998 was 35% of the quarterly notification level and 2% of the new correction level. Other discharges were well below the notification and correction levels. The NSB concluded that radiation doses to the public due to airborne discharges from HIFAR were well within the NHMRC dose limits, and less (ALARA) objective for members of the public.

An NSB officer attended the November meeting of the Local Liaison Working Party<sup>4</sup> (LLWP) as an observer. The finalised text of the ANSTO brochure entitled "What to do in an emergency", was provided to the meeting, with the brochure to be distributed in the local area. Forthcoming schools information days and responses to requests for public use of the exclusion zone were discussed. The working party was also advised of progress on actions following the bushfires around the Lucas Heights Science and Technology Centre in December 1997, and actions arising from the site emergency exercise earlier in 1998.

### **HIFAR Modifications**

Safety-related modifications to HIFAR are subject to NSB agreement. During the reporting period the NSB received safety submissions for the electrical installation of a third Standby Diesel-Alternator in the backup electrical supply system and for upgrading the reactor

---

4

The ANSTO Local Liaison Working Party, formed under the NSW *Emergency Management and Rescue Act 1989*, co-ordinates the involvement of NSW agencies having responsibilities under the arrangements for emergencies at the Lucas Heights Science and Technology Centre (LHSTC).

instrumentation electrical distribution panel and associated wiring. Both submissions were reviewed and agreed by the NSB.

### **Moata Decommissioning**

Moata is the first nuclear reactor in Australia to enter the decommissioning phase of its life. During the reporting period the NSB requested ANSTO to amend the Authorisation – Moata Operation to include decommissioning. ANSTO reported that the draft amended Authorisation is currently in the process of being reviewed internally before being finalised and provided to the NSB. ANSTO also reported to the NSB that the draft study of decommissioning options, and the radioactive materials inventory assessment, are complete and are to be reviewed within ANSTO. The documentation establishing the safety during decommissioning is in preparation, and other draft documentation relating to decommissioning is currently being reviewed within ANSTO.

### **Proposed Replacement Reactor**

The NSB function to monitor and review the safety of ANSTO's nuclear plant includes the proposed replacement research reactor, pending the establishment of the Australian Radiation Protection and Nuclear Safety Agency. In November the NSB provided to Environment Australia a detailed review of the Draft Environmental Impact Statement of the proposed replacement research reactor sited at the Lucas Heights Science and Technology Centre (LHSTC). The NSB made a number of recommendations for Environment Australia's consideration. These recommendations included that the NSB (ARPANSA) would be a suitable organisation to monitor the implementation of ongoing conditions related to safety imposed on ANSTO by the Minister for the Environment, and detailed ongoing scrutiny of the safety of the project by the NSB (ARPANSA) be a condition for the project to proceed. The NSB also provided comment on the peer reviews undertaken for Environment Australia.

In December ANSTO submitted, for NSB agreement, a Siting Safety Assessment for the proposed replacement research reactor at LHSTC. The submission covered site characteristics and site-related design basis information as required by the NSB's Safety Assessment Principles and Siting Guideline documents. The submission included: a description of the site characteristics important to safety; a description of site related design bases important to safety; compliance with regulatory assessment requirements; and, commitment to ongoing site evaluation. NSB officers reviewed the submission and provided comments to ANSTO, seeking further information.

### **Nuclear Materials Vault and Store**

The proposed ANSTO schedule for the completion of tasks, arising out of the meeting between ANSTO and NSB officers to resolve outstanding issues relating to the safety of the Nuclear Materials Vault and Store, was reviewed by the NSB and comments provided to ANSTO. This facility is used for the storage of new (unirradiated) fuel and other fissile materials under International Atomic Energy Agency arrangements.

## **Irradiated Nuclear Fuel**

An attempt was made in late January to retrieve the irradiated fuel elements and canister damaged in the incident in the dry storage facility in August 1998, which was reported previously. The fuel elements, which had been unloaded from the reactor many years before, and the damaged canister were successfully recovered from the storage tube. On 1 February 1999 two further canisters were removed from the storage tube. During this operation, the final canister fell off the grab inside the shielding flask and, as the flask was suspended a small distance above the floor, partially protruded from bottom of the flask. The flask was immediately lowered to the floor to provide complete shielding of the dropped fuel elements. It is believed that the drop may have been due to damage to the canister's lifting flange sustained during the original fuel handling incident in August 1998.

ANSTO management verbally informed the NSB of the incident and will provide a full report. The NSB understands that no operating staff received a significant radiation dose as a result of the incident. The incident will be reported in detail in the first Quarterly Report for ARPANSA following receipt of a report of the incident from ANSTO.

During the reporting period the NSB notified ANSTO that it agreed with ANSTO's rating on the International Nuclear Event Scale (INES) of Level 0 (of no safety significance) for the Building 41 fuel handling incident in March 1998. With regard to the INES rating of the fuel handling incident in Building 27 in August 1998, ANSTO provided the NSB with a provisional INES rating of Level 0. However, ANSTO was subsequently informed that the NSB had rated this incident at INES Level 1 (anomaly beyond the authorised operating regime).

## **Restrictions on Operation of Nuclear Plant**

Under Section 37C. of the Act, the NSB may impose restrictions or conditions on the operation of ANSTO's nuclear plant. The NSB uses the term 'restriction' to mean a requirement to shut down, or delay startup, of a reactor. The terms 'condition' and 'requirement' are applied to all other types of intervention by the NSB. During the quarter the NSB did not place any restrictions or conditions on the operation of HIFAR or Moata.

## **Conclusion on the Safety of Nuclear Plant Operated by ANSTO**

The Nuclear Safety Bureau continued to monitor the safety of operation of ANSTO's nuclear plant and concluded that safety was satisfactory during the reporting period.

## **ADVICE TO THE COMMONWEALTH**

As reported above, the NSB provided to Environment Australia a detailed review of the Draft Environmental Impact Statement of the proposed replacement research reactor at the Lucas Heights Science and Technology Centre. The NSB made a number of recommendations for Environment Australia's consideration.

An NSB officer attended a Technical Committee Meeting of the International Atomic Energy Agency in Vienna to review a draft Code on Safety Requirements in the Design and Operation of Research Reactors. The NSB contributed to the development of this code that is directly relevant to the operation of the existing research reactor operated by ANSTO and the design of the proposed replacement reactor.

During the reporting period an NSB officer attended as the Australian member a meeting in New York of the Nuclear Safety Advisory Group for the Korean Peninsular Energy Development Organisation (KEDO). In 1995 the Governments of Japan, the Republic of Korea and the USA established KEDO to finance and build two large nuclear power reactors in the Democratic Peoples Republic of Korea which in return agreed to abide by the International Treaty on the Non-Proliferation of Nuclear Weapons. The Australian Government joined KEDO in June 1995. The Advisory Group oversees safety of the project.

Officers of the NSB attended the Nuclear Powered Warship Seminar held at the Australian Emergency Management Institute, Mt Macedon, Victoria, in January 1999 organised by Emergency Management Australia (EMA). Other attendees included State and Territory radiation control officers, members of a Commonwealth interdepartmental committee and representatives of the Canadian Directorate-General of Nuclear Safety. Items discussed included port safety plans, monitoring equipment, accident recovery and accident modelling in relation to assessing the suitability of Australian ports for visits of nuclear-powered warships.

## **MINISTERIAL DETERMINATIONS AND DIRECTIONS**

There were no Ministerial determinations or directions to the NSB during the quarter.

## **STAFFING OF THE BUREAU**

At 4 February 1999, the NSB consisted of the Acting Director and nine other staff, which was equal to the Approved Staffing Level of ten. On 5 February 1999 the *Australian Radiation Protection and Nuclear Safety Act 1998* was proclaimed, the NSB was disbanded and its staff transferred to the newly established agency.