



Replacement Research Reactor Project

SAFETY MANAGEMENT PLAN

**Prepared By
Australian Nuclear Science and Technology Organisation**

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1 SCOPE AND PURPOSE

This plan outlines the safety management system, including responsibilities, policies and procedures, that is in place to assure operations of the Reactor Facility are safe and respect regulatory requirements.

2 REFERENCES

1. RRR Safety Analysis Report
2. Regulatory Guideline on Review of Plans and Arrangements, ARPANSA, RB-STD-15-03, Version 0, August 2003
3. APOL 2.1 - "ANSTO Health, Safety and Environment Policy"
4. APOL 2.1 D 01 – “Delegations for Safety Management”
5. ANSTO Safety Directive series
6. ARPANSA Licence Conditions Handbook (RB-STD-26-01), Part 4, Section 4.1.1 – “Standard Licence Conditions to Operate a Controlled Facility”
7. Occupational Health & Safety (Commonwealth Employment) Act 1991
8. NSW Occupational Health & Safety Act 1983

3 DEFINITIONS

The following definitions have been used in this plan.

The reactor facility; or the Replacement Research Reactor (RRR)	The reactor facility means the multipurpose research reactor that will replace HIFAR, and its associated buildings, physical plant, structures, components and systems including software and, where relevant, any management systems necessary to achieve the design, construction and operation of the facility.
The site of the reactor facility	An area of approximately four hectares situated at the western end of the Lucas Heights Science and Technology Centre.
The Lucas Heights Science and Technology Centre (LHSTC)	An area of approximately 70 hectares, including a number of facilities immediately outside the perimeter security fence, such as the Lucas Heights Motel, canteen, Woods Centre, and other buildings in the ANSTO Technology Park as shown on Figure 1.

4 SAFETY MANAGEMENT SYSTEM

RRR safety management arrangements are in accordance with the established ANSTO Safety Management System. The Safety Management System ensures that hazards are identified and the risk is managed so that all activities are conducted safely by providing a framework for:

- Minimising the likelihood of incidents or accidents;
- Managing nuclear safety, radiation protection and occupational health and safety; and
- Protecting human health and the environment.

- Promotion of a positive safety culture

This regime gives assurance that all operations continue to be conducted safely and in manner that is consistent with regulatory commitments.

4.1 SCOPE OF THE SMS

In addition to regulatory requirements imposed under the ARPANS Act, conventional occupational health and safety of operations of the Reactor Facility are regulated by COMCARE. For potential hazards where no Commonwealth regulation exists, ANSTO has undertaken to comply with relevant State regulations. Such hazards include pressure vessel standards, fire safety, chemical safety, cooling tower standards and safety of lifting equipment.

ANSTO also complies with regulatory requirements for aqueous and airborne discharges from site.

4.2 ELEMENTS OF THE SMS

The main features of ANSTO's safety management system are

- The **ANSTO Health, Safety and Environment Policy** (APOL 2.1) which commits ANSTO to safe operation of facilities, and emphasises the priority given to safety. This policy is located on the intranet and is readily understood by staff. This policy is supported by Safety Directive 7.1 Statement of Occupational Health and Safety Policy which provides more details in the health and safety area.
- A series of safety directives which establish health and safety requirements for ANSTO operations. Safety Directives are issued by the Executive Director
- Clear, unambiguous lines of responsibility in safety matters. Safety Directive 1.1 Safety Management System Overview clearly spells out that responsibility for safety rests with the line management of the source, facility, laboratory, or office. The delegations attached to APOL 2.1 explain the delegations in safety matters. Safety Directive 1.3 Safety Responsibilities of Area Supervisors explains the duties and responsibilities of Area Supervisors. Individual employees are responsible for undertaking their activities in a safe manner and are encouraged to take a pro-active approach to safety matters.
- A formal safety assessment and approval system as set out in Safety Directive 2.1. This describes the review process that takes place before operation of plant and the monitoring process that gives assurance that the plant is being operated safely. The system comprises:
 - the ANSTO Health, Safety and Environment Committee (AHSEC) which oversees the safety issues and reports directly to the Executive Director; This committee has two external members, one of whom chairs the Committee.
 - the Safety Assessment Committee (SAC), which has an external member, is the internal body for assessing and approving all other activities; and
 - the Environmental Monitoring Committee (EMC) which oversees the monitoring of all solid, liquid and airborne discharges and any operations with potential off-site effects. (See figure 1)
- A system for providing adequate induction and supervision of contractors as set out in Safety Directive 1.5.

- A system of permits for working in hazardous areas as set out in Safety Directive 7.11.
- A system for the control and categorisation of modifications as set out in Safety Directive 2.2.
- An incident reporting system that emphasises and facilitates learning from errors. ANSTO operates both an internal and an external incident reporting system, as described in Safety Directive 4.1. This provides a staged process of notification (depending on the severity of the incident) and requires that incidents are investigated, corrective actions implemented, and that lessons on technical and human factor aspects of the incident are learned from the incident.
- Specific controls for radiation protection (Safety Directive 5.1) and a policy of "*As low as reasonably achievable*" (Safety Directive 5.2).
- Specific controls for nuclear safety. Safety Directive 6.1 outlines the principles of Nuclear Safety whilst Safety Directive 6.2 sets out the requirements for criticality control.
- Specific requirements are in place for electrical equipment (SD 7.7), chemicals (SD 7.6), entry to, and work in, confined spaces (SD 7.10) etc. Specific approvals are required for pressure equipment (SD 7.13) and Lifting equipment (SD 7.8).
- All staff are required to attend a safety induction course.
- Specialised training in areas such as radiation protection, confined space entry, safety auditing is provided on an as required basis.

Safety performance is monitored through management review of incidents and key performance indicators for safety. In addition, safety is considered at each ANSTO management meeting.

4.3 REACTOR FACILITY SAFETY ADVISORY GROUPS

In addition to the committee structure noted above, two additional groups have roles in providing safety advice to the Manager of Reactor Operations and Reactor Manager:

- The Reactor Advisory Committee which provides advice on nuclear safety. Further details on the roles and responsibilities of this Committee are provided in Chapter 13 of the SAR.
- The Reactor Facility Radiation Safety Committee which advises on radiation protection matters. Further details on the roles and responsibilities of this Committee are provided in the Plan on Radiation Protection. (The Radiation Protection Adviser, who is a member of the Radiation Safety Committee, provides professional radiation protection advice and review of local radiation protection arrangements.)

5 REGULATORY ENVIRONMENT

5.1 SAFETY OF FACILITIES

The Reactor Facility has been designed to ensure compliance with a wide range of appropriate codes and standards, including IAEA recommendations, on the adoption of the system of safety categorisation of all items, provision of engineered safety features and a

rigorous safety analysis demonstrating that the level of risk associated with operation of the facility meets recognised international standards. The Reactor Facility has been subjected to thorough inspection throughout construction and conformance with design is confirmed through the thorough review and commissioning process to ensure that the operation complies with the safety features detailed separately in the SAR.

5.2 SAFETY CULTURE

Reactor Facility Management, through the safety management system encourages ongoing minimisation of safety risk and the implementation of appropriate safe behaviour. Activities at the Reactor Facility are undertaken under the guidance of the Reactor Facility management in accordance with the documented procedures as amended within the quality system. Personnel are trained and assessed for their specialist skills and, are encouraged to take responsibility for ownership of safety. Open communication and use of safety committees enable staff to report safety concerns and contribute to effective solutions. Human factors analysis and task analyses are an integral part of the safety management system.

Periodic safety culture surveys are used to identify opportunities for improvement and any emerging issues.

SD5.1: *Radiation Protection Principles* (SD5.1) commits ANSTO to enabling a positive safety culture that guides the attitudes and behaviour of all individuals in the realisation of the radiation protection objectives. To achieve this, ANSTO ensures sound management practices; good engineering and laboratory practices; attention to quality assurance, training and qualification of personnel; implementation of a comprehensive safety assessment, monitoring and review system; and feedback from lessons learned from experience and research.

5.3 COMPETENCY, TRAINING AND SUPERVISION

Arrangements are in place for the training and retraining of all personnel involved with the Reactor Facility. Training and accreditation of operators is completed using a combination of theory and practical methods, including use of a simulator, prior to them assuming responsibility. A set of quality-managed procedures and instructions for all activities associated with the reactor facility are in place for all groups.

Effectiveness of training is assured by the shift supervisors and their managers together with the outcomes documented in the Non-conformance reporting systems within a no-blame culture. The ongoing monitoring and comprehensive documentation of outcomes, including the event response system, enables rapid identification of training needs and verification of training outcomes.

Specific safety competency is provided through training outlined in SD 7.3 *Safety Training policy*. This includes training provided by Safety & Radiation Science division that relates to specific requirements of legislation or to provide competency in dealing with specific hazards. All accredited persons are issued with documentation that confirms their achievement and are documented in the training database for future reference and to schedule retraining as required.

Changes to procedures, once receiving the necessary approvals, are communicated to staff supported by appropriate training where necessary, in accordance with the Reactor Facility Quality Management System. See also chapter 13 of the SAR.

5.4 SAFETY OF NON-ANSTO PERSONNEL

Arrangements are in place to ensure that all visitors to the Reactor Facility are informed of hazards and are under the supervision and escort of a Reactor Facility pass-holder at all times.

Non-ANSTO personnel entering the Reactor Facility to conduct work of any kind are required to undergo induction training in accordance with SD 1.2: *Safety Arrangements at LHSTC for Pass Holders*. Induction training includes assessment. These contractors are then supervised by the Contractor Supervisor in accordance with the LHSTC arrangements outlined in SD 1.5: *Supervising Contractors*. Contractor Supervisors are responsible for appropriate supervision commensurate with the Reactor Facility area and the type of LHSTC pass.

The criteria for the selection of contractors are based on past performance, accreditation to ISO-9001 and other relevant issues, as specified in the Reactor Facility Quality Management System.

The safety of visitors is assured by the safety culture initiatives within the Reactor Facility and signage at appropriate locations according to the potential hazard. Radiation dose monitors are issued to all Reactor Facility visitors in accordance with SD5.1. The responsibility of Area supervisors to ensure that all personnel are aware of hazards in the work place (SD 1.3) extends to non-ANSTO personnel.

5.5 CONTROL OF HAZARDS

Reactor Facility hazards for normal situations, such as operations, maintenance, tests and inspections, and abnormal situations are identified and categorised in accordance with safety directives SD2.1 SD2.2, as described above. Safety analyses are performed for all potentially hazardous activities in accordance with the safety management system outlined above. Identified risk are prevented or mitigated through use of:

1. Elimination: Remove the hazard.
2. Substitution or Modification: Replace with a lesser hazard, time delay.
3. Engineering: Ventilation, redundancy, shielding etc.
4. Isolation: Cordoning off an area, distance, guarding etc.
5. Administrative: Local procedures, housekeeping, training etc.
6. PPE: Overshoes, Safety glasses etc.

Specific controls for radiation protection at the Reactor Facility are in accordance with ANSTO policy outlined in SD 5.1. This directive outlines ANSTO commitment to the principle of Defence in Depth as a means of ensuring safe operation and minimisation of hazards. ANSTO incorporate in-depth defensive measures into the design and operating procedures of the Reactor Facility to compensate for potential failures in protection or safety measures. This includes use of multiple barriers to contain radiation and radioactive material, and redundancy and diversity in safety control and monitoring systems where necessary and as appropriate to the hazard.

Operations of the Reactor Facilities will be conducted in accordance with *ANSTO Policy on As Low As Reasonably Achievable* (SD5.2) .

The commitment, objectives and criteria for ensuring and maintaining appropriate standards of nuclear safety for the Reactor Facility are in accordance with SD 6.1 *Nuclear Safety Principles*. Safety Directive 6.2 sets out the requirements for Criticality control of operations involving the storage, handling, fabrication, use, movement or disposal of fissile materials under ANSTO's control. This directive establishes the procedure and responsibilities for the initiation of RRR Criticality assessment, the undertaking of the assessment, the issue of Criticality certificates and the implementation of the certificate's requirements.

Reactor Facility area supervisors are appointed for designated hazardous areas as outlined in SD 1.3 *Safety Responsibilities of Area Supervisors*. An Area Supervisor is a local delegate of management who is authorised to address any health, safety and environment concerns in their designated hazardous area. Area supervisors endorse 'Safe Work Permits' for work of a temporary nature (eg maintenance, inspection or repair work) in designated hazardous areas in consultation with Safety and/or Engineering staff if necessary.

All hazards will be dealt with according to the hierarchy of controls. Where the Commonwealth does not have regulations, compliance with the relevant State regulations is undertaken. Controls for common hazards are outlined in Safety Directives.

Approved activities at the Reactor Facility are reviewed according to the schedule determined at the time of approval, according to their level of proposed risk. Any further modifications to an approved activity are re-categorised and reassessed as described above.

Activities will also be reviewed as part of the reporting system, as described in SD4.1: *The ANSTO Event Response System* (SD4.1) and local procedures.

Operational events and deviations are reported, investigated and rectified through the non-conformance reporting system of the Reactor Facility Quality Management System, including Abnormal Occurrence Reports as appropriate.

5.6 WORKPLACE CONSULTATION

Staff involvement in workplace safety initiatives is achieved through line management consultation and through the workplace Health and Safety Committees and the Central Safety Coordinating Committee.

As required by the OHS (Commonwealth Employees) Act and outlined in SD 1.4: *Implementation of Health & Safety Consultative Arrangements*, a Workplace Health & Safety Committee provides a forum for safety concerns at the Reactor Facility to be raised and addressed. Members of the committee, who are elected, are responsible for regular inspections of the workplace. In addition, a Health and Safety representative will be elected for the Reactor Facility.

5.7 REPORTING AND INVESTIGATION

Reports are made on all Reactor Facility operational deviations and anomalies, whatever the cause. These reports are investigated thoroughly by trained personnel.

The Reactor Facility operates in accordance with the ANSTO event response system that is outlined in SD4.1. This requires the immediate reporting of:

- All events arising from the operation and use of ANSTO's Controlled Apparatus, Controlled Material and Controlled Facilities.

- All accidents and incidents, whether work related, sustained whilst undertaking an endorsed sporting activity during an approved break, or during travel to and from work.
- All events of likely interest to either members of the public or external parties.
- All events that have the potential to reflect on ANSTO's position in the local community or more generally.

The event response system emphasises and facilitates learning from errors and requires that incidents are investigated, corrective actions implemented, and that lessons are learned from the incident.

Data collected from events and routine logs is reviewed regularly and trended for the purpose of identifying performance changes and possible need for corrective actions.

5.8 AUDITS AND REVIEWS

Effective compliance with standards and regulations is achieved at the Reactor Facility in accordance with the ISO9001 quality Business Management System. Qualified auditors conduct auditing and review processes, both internal and external. Furthermore, safety assessment is a systematic process that is carried out throughout the life of the activity or facility to ensure that all relevant safety requirements are being met.

ALARA assessments are conducted in accordance with SD5.2 whenever doses are greater than 0.02 mSv/y for the public or 2 mSv/y for radiation workers.

Reviews of local procedures are completed regularly in accordance with ISO-9001 and other requirements. Any identified changes are incorporated in accordance with the quality procedures after being submitted for independent review as appropriate.

Reviews and audits of Radiation Protection matters are addressed in the Radiation Protection Plan.

5.9 RECORDS

The activities of the Reactor Facilities, including training, incident reporting, investigation, audits and reviews are recorded in accordance with the ANSTO and the Reactor Facility Business Management System, as appropriate. These systems are accredited under ISO 9001:2000.