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Replacement Research Reactor Project

APPLICATION FOR A FACILITY LICENCE, OPERATING AUTHORISATION FOR THE REPLACEMENT RESEARCH REACTOR

Prepared By
Australian Nuclear Science and Technology Organisation

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1 PURPOSE AND SCOPE OF THIS DOCUMENT

This document constitutes Part A of the Application for a Facility Licence, Operating Authorisation, hereafter referred to as the Application, made by the Australian Nuclear Science and Technology Organisation (ANSTO) for the Replacement Research Reactor, hereafter referred to as the Reactor Facility, in accordance with the requirements of the ARPANS Act 1998 and Regulations 1999 as amended.

This Application seeks to obtain a Facility Licence authorising ANSTO to operate a nuclear installation in the form of the Replacement Research Reactor (the Reactor Facility). The Application is sub-divided into parts as follows:

Part A: General information on the purpose and location of the Reactor Facility (this document).

Part B: The plans and arrangements for managing safety for the Reactor Facility.

Part C: The Safety Analysis Report (SAR) for the Reactor Facility together with associated safety and licensing documentation.

Part D: The Operational Limits and Conditions (OLCs) for the Reactor Facility.

Part E: The plans and arrangements for hot commissioning the Reactor Facility.

ANSTO will manage the Facility Licence and associated Authorisations for the Reactor Facility separately to other Licences or Authorisations obtained from ARPANSA for existing facilities operated by ANSTO. This situation will be reviewed following a period of satisfactory normal operation of the Reactor Facility, which is anticipated to occur during 2006. It is the intention of ANSTO to operate the HIFAR reactor for a period of up to six months after commencement of normal operation of the Reactor Facility, after which HIFAR would be permanently shut down and its Operating Licence eventually replaced with a Decommissioning Licence.

This Application also covers the neutron guide hall and the various structures, systems and components contained therein that form a permanent part of the Reactor Facility as described in the SAR in Part C of this Application. A separate licence will be sought for the Neutron Beam Instruments (NBI) under the auspices of ANSTO's Bragg Institute in accordance with the requirements of the ARPANS Act 1998 and Regulations 1999. ANSTO considers that this is an appropriate approach, since it separates the ANSTO organisation with effective control of the NBI from the ANSTO organisation with effective control of the Reactor Facility.

Definitions of terms used in the Application are provided in Section 7.

2 PURPOSE OF THE REACTOR FACILITY

This section describes the purpose of the Reactor Facility, as part of the general information required by ARPANS Regulation 39; Schedule 3, Part 1, item 2.

The Reactor Facility has been designed and will be operated to meet Australia's current and future needs for a neutron source in a manner that meets all health, environmental and safety standards. Specifically, the Reactor Facility has the following purposes:

- maintain Australia's nuclear technical expertise, in order to provide sound advice to Government in support of nuclear policy issues of strategic national interest and international obligations in this area;
- maintain and enhance health care benefits provided to the community and ensure security of supply, through local production of the quantities and the known likely range of diagnostic and therapeutic radiopharmaceuticals needed to satisfy the requirements of Australia's medical professionals over the next 40 years;
- provide a neutron beam research facility which will not only meet Australia's own scientific and industrial needs, but will also be a regional centre of excellence. Research undertaken using this facility will have broad application to investigations in a wide spectrum of scientific and industrial fields, including the life sciences and medicine, environmental science, chemistry, materials science and engineering science;
- provide research and research training facilities and programs to enhance the educational opportunities available to Australia's scientists and engineers;
- provide industrial radioisotopes and facilities for neutron activation analysis, irradiation of materials, and neutron radiography to service the needs of agriculture and industry, particularly in the electronics, environmental, resource and minerals processing industries.

Further information on the purpose and benefits of the Reactor Facility was provided in the Environmental Impact Statement (PPK, 1998 and 1999), which formed part of the Application for a Facility Licence, Site Authorisation, and the Preliminary Safety Analysis Report (PSAR, ANSTO, 2000), which formed part of the Application for a Facility Licence, Construction Authorisation.

The utilisation of the Reactor Facility is described in Chapter 11 of the SAR contained in Part C of this Application.

3 DESCRIPTION OF THE FACILITY AND ITS SITE

The following provides information on the Reactor Facility and its site, as part of the general information required by ARPANS Regulation 39; Schedule 3, Part 1, item 3.

3.1 THE SITE

The Reactor Facility has been built on land owned by ANSTO at the western end of the Lucas Heights Science and Technology Centre adjacent to HIFAR, as shown on the Lucas Heights Site Plan in Figure 1. The site of the Reactor Facility is within the existing perimeter fence and covers an area of approximately four hectares.

The site and its characteristics, including surrounding land, is described in Chapter 3 of the SAR contained in Part C of this Application.

ANSTO intends to maintain the buffer zone of 1.6 kilometres, centred on the existing HIFAR facility, within which land use restrictions apply and all residential development is excluded.

3.2 FACILITY

The location and layout of the reactor facility is described in Chapter 4 of the SAR contained in Part C of this Application. Descriptions of the individual buildings and systems are in the associated SAR Chapters.

3.3 STATUS OF THE REPLACEMENT REACTOR FACILITY DEVELOPMENT

Following the completion of the Environmental Impact Statement, ANSTO submitted an application to ARPANSA for a Facility Licence, Site Authorisation in April 1999. In September 1999, ARPANSA issued a Facility Licence, Site Authorisation (F0001) together with a number of licence conditions. When all the licence conditions were completed or superseded by the licence conditions associated with the Facility Licence, Construction Authorisation (F0118), a request to surrender this Facility Licence, Site Authorisation (F0001) was submitted in July 2003. ARPANSA granted this request in August 2003 and the Facility Licence, Site Authorisation (F0001) was surrendered.

In August 1999, ANSTO issued a request for tender and subsequently conducted a detailed tender evaluation of four pre-qualified tenderers. This culminated in the award of the contract to INVAP SE, in association with a joint venture between John Holland Group Pty Ltd and Evans Deakin Industries in July 2000. The detailed design process started in July 2000 and continued through to early 2001. The completion of the design enabled an Application for a Facility Licence, Construction Authorisation to be submitted in May 2001. That application was built around the Preliminary Safety Analysis Report (PSAR), and the details required by ARPANSA under its Act and Regulations. The Application for a Facility Licence, Construction Authorisation also included the cold commissioning of the Reactor Facility, prior to fuel loading. In April 2002, ARPANSA issued a Facility Licence, Construction Authorisation (F0118), which contained a number of licence conditions identified in Schedule 4 of the licence.

Following completion of the detailed design process and in parallel with the submission of the Application for a Facility Licence, Construction Authorisation, preparation of detail engineering design deliverables upon which the actual construction of the Reactor Facility would be based started. As implied, the detail engineering design deliverables detail the actual design of the Reactor Facility to a far greater degree than that in the detailed design contained in the PSAR.

Following the issue of a Facility Licence, Construction Authorisation (F0118) in April 2002, work on the civil construction and the manufacture/procurement and installation of structures, systems and components was started. In the cases where the structures, systems or components were items important to safety, then an additional approval was sought from ARPANSA in accordance with ARPANS Regulation 54 and Facility Licence, Construction Authorisation (F0118) Schedule 4, Licence Condition 4.6. No item important to safety has been constructed or installed without such approval being granted.

The current status of the Reactor Facility as at the time of this Application is as follows:

- The preparation of detail engineering design deliverables is generally complete. Minor issues relating to the shielding of the neutron guides in the Neutron Guide Hall are yet to be finalised. Of the approximately 130 anticipated submissions to ARPANSA for approval to construct an item important to safety under ARPANSA Regulation 54 and Facility Licence, Construction Authorisation (F0118) Schedule 4, Licence Condition 4.6, 120 are complete. Ten submissions, mainly associated with requesting approval to install systems already approved for manufacture, are in process.

- The construction of the civil works is nearing completion. The outstanding areas of work relate to the pouring of the heavy concrete of the Reactor Block (including the Above Pool Hot Cell Complex) and the finishing on various structures, internally and externally.
- The procurement/manufacture and installation of structures, systems and components is ongoing. The Reactor Pool and Service Pool have been installed, as have the majority of the process systems. Items outstanding at this time relate to the manufacture and installation of internal components within the Reactor and Service Pools and the installation of the various Instrumentation and Control (I&C) systems.
- The testing of installed systems and components has started for some systems, and will continue on an ongoing basis as and when they are installed.
- A plan for cold commissioning has been submitted to ARPANSA in response to Facility Licence, Construction Authorisation (F0118) Schedule 4, Licence Condition 4.7.

All these activities will be completed prior to the loading of fuel into the Reactor Facility and the start of hot commissioning.

A summary of the verification of activities covered by the Facility Licence, Construction Authorisation (F0118) is contained in a report entitled “Verification of Design, Construction, Pre-Commissioning and Stage A Commissioning Activities under the Facility Licence Construction Authorisation (F0118)” (RRRP-7200-EBEAN-008). This report is contained in Part C of this Application.

4 MANAGEMENT OF THE FACILITY

This section is sub-divided into two, where Section 4.1 described the management of the design, construction and cold commissioning of the Reactor Facility and Section 4.2 describes the operation of the Reactor Facility.

4.1 MANAGEMENT OF THE CONSTRUCTION OF THE REACTOR FACILITY

ANSTO has managed the construction of the reactor facility in a manner that meets applicable health, safety, security, safeguards, environmental and quality standards, and relevant international obligations. INVAP S.E. of Argentina is the principal Contractor (hereafter referred to as the Contractor) with responsibility for the design, construction, commissioning and performance demonstration of the Reactor Facility.

The Contractor has acted as an agent for ANSTO during the construction phase. ANSTO has the responsibility to review and verify the design process, the design products, and the ongoing Contract activities emanating from the Contract design, including the Construction, Inspection and Test Plan, Contract deliverables, and the Safety and Licensing Plan.

During the construction and cold commissioning, the management of the construction site safety, site security and the environmental impact of construction has been the responsibility of the Contractor, with relevant plans approved by ANSTO and Comcare as required under Occupational Health and Safety legislation, and as required by the conditions set out by the Minister for the Environment and Heritage.

4.1.1 Project Management Plan

ANSTO's arrangements for maintaining effective control of the design, construction and cold commissioning of the Reactor Facility are outlined in the Application for a Facility Licence, Construction Authorisation. Summaries of the project organisation, responsibilities of key project personnel and the project schedule are given below.

4.1.1.1 Organisation of the Replacement Research Reactor Project

The organisation of the project has not changed from that identified in Section 3 of the Application for a Facility Licence, Construction Authorisation, with the exception of the addition of various positions within the Project Core Team as identified in Section 4.1.1.2 below.

4.1.1.2 Project Responsibilities

The project is managed by ANSTO through a dedicated Project Core Team, which manages the day to day activities, and through a Project Monitoring Group, which manages the interfaces with ANSTO Divisions and activities.

The Project Core Team has expanded from that identified in the Application for a Facility Licence, Construction Authorisation and comprises the following:

- Project Manager
- Engineering Manager
- Safety and Licensing Manager
- Test and Trials Manager
- Construction Coordinator
- Quality Assurance Coordinator
- Operations Planning Coordinator
- Commissioning Planning Coordinator
- Commissioning Reactor Manager
- Commercial Manager
- Business Manager

The roles and responsibilities of the members of the Project Core Team are as follows.

The *ANSTO* Executive Director is responsible to the ANSTO Board for the successful implementation of the Project. The Executive Director has the responsibility to instruct the Project Manager from time to time on any matter related to the achievement of the Project's objectives:

- cost within budget;
- delivery within program; and
- Project performance to desired levels.

The ANSTO Board and Executive Director also receive regular risk audit reports on the Project from an external risk auditor.

The Project Manager is responsible to the ANSTO Executive Director for the delivery of Phase 3 (the design, construction and commissioning phase) of the RRRP in accordance with the Contract, including:

- cost within budget;
- delivery within program;
- project performance and resources; and
- effective risk management.

The Project Manager provides regular reports to the ANSTO Board Audit Committee and to the Board itself.

The Engineering Manager is responsible to the Project Manager for the management of the following Contract activities, and also undertakes such other functions as may be determined from time to time in relation to the Contract:

- Design Plan (and related activities)
- Construction, Inspection and Test Plan
- Commissioning Plan
- Quality Assurance Program

The Safety and Licensing Manager reports administratively to the ANSTO Director, Safety and Radiation Science and functionally to the Project Manager to ensure effective integration of all safety and licensing activities within the Project Core Team.

The Test and Trials Manager is responsible to the Engineering Manager for the management of the review and verification activities relating to the development and conduct of the Construction Inspection and Test Plan.

The Quality Coordinator is responsible to the Project Manager for ensuring that the Quality Assurance requirements and objectives of ANSTO in relation to the project are implemented and maintained.

The Construction Coordinator is responsible to the Project Manager for the coordination of all Principal Furnished Material (PFM) Work Packages issued to the ANSTO Divisions, and activities related to the Balance of Plant including Buildings and Structures.

The Operations Planning Coordinator is responsible to the Project Manager for the coordination of the interface for oversight of Integrated Logistics Support (ILS) contractual requirements and development of systems required to support operation and maintenance of the Reactor Facility from the commencement of operation.

The Commissioning Planning Coordinator is responsible to the Project Manager for the coordination of planning activities in relation to the commissioning of the Reactor Facility.

The Commissioning Reactor Manager is responsible to the Project Manager for the operation of the Reactor Facility during commissioning in accordance with the Commissioning Plan (see Part E of this Application).

The Commercial Manager is responsible to the Project Manager for the management of commercial issues associated with the Contractor.

The Business Manager is responsible to the Project Manager for management of the interface between the Project and the ANSTO Business Management System.

A number of ANSTO personnel were also attached to the Project Core Team, reporting to the Engineering Manager to fulfil the following functions:

- Document Control
- Mechanical and process plant coordination
- Electrical systems coordination
- Instrumentation and Control (I&C) coordination
- Clerk of Works

In addition, a large number of ANSTO personnel were also involved in the review, verification and acceptance of the detail engineering design deliverables produced by the Contractor.

4.1.1.3 Layout of Project Schedule

The following layout of the project schedule is provided for completeness.

Activity	Actual/*Scheduled* Completion
PHASE 1 – Preparation	
Environmental Assessment	
Issue of Draft Environmental Impact Statement	17 August 1998
Public comment on Draft Environmental Impact Statement	9 November 1998
Issue of Final Environmental Impact Statement	18 January 1999
Decision by Minister for Environment and Heritage	30 March 1999
Application for ARPANSA Facility Licence, Site Authorisation submitted	13 April 1999
ARPANSA Facility Licence, Site Authorisation issued	22 September 1999
Public Works Committee	
Proposal referred to Public Works Committee	17 February 1999
Public hearings	5,6 and 14 May 1999
Public Works Committee report tabled in Parliament	25 August 1999
Parliamentary approval	26 August 1999
Preparation for calling tenders	
Prequalification of reactor vendors	December 1998
Prepare Request for Tender	January to July 1999
PHASE 2 – Tender Process	
Tenders called	August 1999
Tenders received	3 January 2000
Contract awarded	13 July 2000
PHASE 3 – Design, Construction and Commissioning	
Application for ARPANSA Facility Licence, Construction Authorisation submitted	18 May 2001
ARPANSA Facility Licence, Construction Authorisation issued	04 April 2002
Application for ARPANSA Operating Authorisation lodged	10 September 2004
Start of cold commissioning	*August 2005*
ARPANSA Operating Authorisation sought	*November 2005*
Fuel loading and start of hot commissioning	*November 2005*

Activity	Actual/*Scheduled* Completion
First full power operation	*February 2006*
Final Safety Analysis Report (incorporating results of commissioning)	*July 2006*

4.1.2 The Safety Management Plan

The Safety Management Plan for the construction was developed by the contractor, as it relates to construction hazards. This plan ensured that hazards were identified and managed so that all activities were conducted safely and a positive safety culture promoted. This plan was subject to review by Workcover and Comcare.

4.1.3 Radiation Protection and Radioactive Waste

The construction and cold commissioning phase do not involve any work with radioactive materials and hence, no specific radiation protection or radioactive waste management plans are needed for this phase.

4.1.4 The Security Plan

Site security was controlled by the Contractor using conventional security arrangements for a construction site during the construction phase, as described in the site construction plans. Construction employees did not transit through the LHSTC site but entered the construction site through a separate entrance off Old Illawarra Road. The Australian Protective Service controlled this gate during the construction phase. Hence, there was no need for construction employees to have access to the ANSTO facilities during construction.

The following are the Standards applicable to security used for the Project during the construction phase:

- ANSTO Security Policy and Procedures;
- Protective Security Manual (2000), Australian Government Publishing Service, Canberra;
- Australian Government “Security Construction and Equipment Committee Manual”.
- Convention on Physical Protection of Nuclear Material (IAEA) INFCIRC/274.
- IAEA document INFCIRC 225/Rev 4, “The Physical Protection of Nuclear Materials and Nuclear Facilities”;
- Bilateral Agreements (USA, UK, Argentina).
- IAEA document INFCIRC/217 and INFCIRC/217/Add 1, the Agreement Between Australia and the Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons and the Protocol Additional thereto;
- Security Construction and Equipment Committee Criteria for Endorsed Equipment, Attorney General’s Department;
- ANSTO General Specification for Installation of Access Control at LHSTC.
- Nuclear Non-Proliferation (Safeguards) Act 1987 and ANSTO's Permits issued pursuant to that Act:
    - PN001 - Permit to Possess Nuclear Material

- PA001 - Permit to Possess Associated Items, and
- PA002 - Permit to Possess Associated Material.

Once the Reactor Facility's security systems are made operational during the cold commissioning phase, ANSTO security arrangements will apply. The construction gate will be closed and the main LHSTC gate will be used for access thereafter.

4.1.5 The Emergency Plan

Planning for emergencies at the LHSTC satisfies the requirements of the *NSW State Emergency and Rescue Management Act 1989*. For accidents, incidents or emergencies with on-site consequences only, the following plans currently exist:

- The Lucas Heights Science and Technology Centre Emergency Plan (ANSTO document P2.1.02.01, Rev 2, 2001) which describes the on-site emergency arrangements for situations which can be handled by ANSTO personnel; and
- The ANSTO Emergency Plan (DISPLAN) (ANSTO document P2.1.02.02 Rev 2, 2001), which provides for the on-site emergency arrangements which require assistance and control from the NSW Combat Agencies. ANSTO personnel provide full technical support to this Plan.

For accidents, incidents or emergencies with off-site consequences, the following plans describe the escalating arrangements for controlling emergencies:

- Sutherland Shire Local Disaster Plan (DISPLAN);
- Georges River District Disaster Plan (DISPLAN); and
- NSW State Disaster Plan (DISPLAN).

All Emergency Plans relating to the LHSTC are reviewed and authorised by the ANSTO Local Liaison Working Party (LLWP).

During construction, when the site was physically separate from the LHSTC and controlled by the Contractor, it was covered by a construction emergency/evacuation plan. Since there were no radioactive materials requiring licensing on the construction site, the hazards were typical of a construction site. ANSTO emergency arrangements include notification to the Contractor of any incident on the LHSTC that might affect the Reactor Facility site.

Prior to cold commissioning, the security system will be commissioned and the Reactor Facility will become part of the LHSTC site. Subsequently, nuclear materials in the form of fuel assemblies will be brought onto the site and stored in the new fuel store within the facility. The ANSTO emergency plans will apply and ANSTO emergency response staff will respond to any incident and liaise with the Contractor's representative as appropriate.

4.1.6 The Quality Management System

The Replacement Research Reactor Project (RRRP) quality system was audited by the then QAS and certified to ISO 9001:1994 in April 2001. This certification was subsequently revised to ISO 9001:2000 as a result of an audit by SAI Global (formerly QAS) in November 2001. ARPANSA officers have also attended these audits as observers. Similarly, the Contractor (INVAP) was audited by BVQi and initially certified to ISO 9001:1994 in November 1999. This certification was subsequently revised to ISO 9001:2000 in June 2003.

All activities performed by the Contractor and sub-contractors during the construction of the Reactor Facility have been performed in accordance with a certified quality system or its

equivalent. In the case of sub-contractors that did not have a certified quality system in place, the Contractor's quality system was applied. All sub-contractors involved in the construction of items important to safety have been subject to audits by INVAP and (where appropriate) ANSTO.

Similarly, all activities performed by ANSTO during the construction of the Reactor Facility have been performed in accordance with the RRRP quality system. In particular, all detail engineering design deliverables submitted by the Contractor were subject to ANSTO review, verification and acceptance in accordance with the relevant quality procedures.

4.2 MANAGEMENT OF THE OPERATION OF THE REACTOR FACILITY

The plans and arrangements for the safe management of the Reactor Facility during operation form Part B of this Application. This section provides a summary of these plans and arrangements. These plans and arrangements make use of ANSTO's collective management experience, including over 40 years of research reactor operating experience with HIFAR, and are consistent with international practices in the operation of pool-type research reactors.

Note that these plans and arrangements are consistent with ARPANSA document "Regulatory Guideline on the Review of Plans and Arrangements" (RB-STD-15-03), with the addition of the Environmental Management Plan that the CEO of ARPANSA also requested be submitted as part of the Application for a Facility Licence, Operating Authorisation.

The transition from the management of the construction of the Reactor Facility to the management of the operation will occur during the commissioning phase, principally during cold commissioning that will be completed under the scope of the Facility Licence, Construction Authorisation (F0118). As such, these plans and arrangements may change as a result of this commissioning process. These plans and arrangements may also change in the light of operating experience or evolving organisational requirements during the life of the Reactor Facility. Any such changes will be performed in accordance with the appropriate procedure of modifications, and will be subject to review and approval by ARPANSA as appropriate as described in the Safety Management Plan contained in Part B of this Application.

A list of the manuals associated with the operation of the Reactor Facility, together with an outline of the contents of the Plant Operation Manual, is contained in Part C of this Application.

4.2.1 Plans and Arrangements for Maintaining Effective Control of the Reactor Facility

The plans and arrangements for maintaining effective control of the Reactor Facility are based on the ANSTO site-wide system for safe operation of facilities. They are based on assignment of clear roles and responsibilities, specific training, assurance of appropriate resources and a process for review and monitoring. A hierarchical documentation system describes the administrative processes by which the Reactor Facility is safely and effectively managed. This is achieved primarily through the Reactor Facility Quality Management System (QMS), together with the integration of other safety and administrative processes relating specifically to the Reactor Facility with those relating to the wider ANSTO organisation. Use of this system is one means by which the Reactor Facility management communicates its expectations to staff and monitors performance and compliance with regulatory requirements. The QMS brings together, in one system, administrative controls to ensure safety, regulatory, operational, quality, environmental and commercial objectives are met.

4.2.2 Safety Management Plan

The Safety Management Plan describes the ANSTO safety management arrangements as they apply to the Reactor Facility.

The Reactor Facility will be operated in a manner that protects human health and the environment, and promotes continual improvement in safe working practices, in accordance with its duty of care and with all applicable statutory obligations. This commitment is in accordance with ANSTO strategic policy, as set out in the ANSTO Health, Safety and Environment Policy (APOL 2.1). To achieve these objectives, an effective safety management regime has been implemented to give assurance that experiments, processes and operations are conducted safely and that their performance is consistent with safety and environmental commitments. APOL 2.1 also commits ANSTO to values such as safety and environmental awareness being integral to, and a priority in, all operations.

Implementation of the Reactor Facility safety management arrangements is in accordance with the ANSTO Safety Management System. The system is detailed in Safety Directives, which apply to all staff, are issued by the Executive Director and are disseminated to all staff. These arrangements inform staff of health and safety requirements. The Safety Management System ensures that hazards are identified and their 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;
- Protecting human health and the environment; and
- Promoting a positive safety culture

The Reactor Facility safety management arrangements are part of the overall ANSTO safety management system and complement other management arrangements, as outlined in SD 1.1: *Safety Management System Overview*.

4.2.3 Radiation Protection Plan

The Radiation Protection Plan describes the organisational arrangements for the control of exposures to ionising radiation during all activities involved with the operation of the Reactor Facility. It outlines the systems and processes that ensure compliance with standards and regulatory requirements on radiation protection and the application of optimisation of protection, which contribute to the development of a safety culture in Reactor Facility.

The Radiation Protection Plan applies to all activities associated with the normal operation of the Reactor Facility and the radiation protection of all persons within the facility. This includes the reactor staff, those who utilise the reactor facilities, support services, and persons within ANSTO and external to ANSTO.

The systems and processes outlined in this document address current best practice, and are in line with IAEA guidelines for radiation protection.

4.2.4 Radioactive Waste Management Plan

The Radioactive Waste Management Plan describes the organisational arrangements and responsibilities for the control, storage and transfer of the radioactive waste generated from the Reactor Facility. It details how solid and liquid radioactive waste generated by the operation of the Reactor Facility will be transferred to ANSTO's Waste Operations and

Technology Development (WOTD) section. It also sets out the measures in place for the control of any airborne emissions from the Reactor Facility.

The systems and processes outlined in this document address current best practice, including waste minimisation principles, and are in line with IAEA guidelines for the safe management of radioactive waste.

4.2.5 Ultimate Disposal or Transfer Plan

The Ultimate Disposal or Transfer Plan describes the arrangements for the ultimate disposal or transfer of all radioactive waste arising from the operation of the Reactor Facility. This includes the ultimate disposal of spent fuel and the decommissioning of the Reactor Facility.

4.2.6 Security Plan

The Security Plan describes the arrangements for the security of the Reactor Facility. It is subject to the approval of the Director General ASNO, who issues permits for ANSTO to store, use and transfer nuclear materials.

4.2.7 Reactor Facility Emergency Plan

The Reactor Facility Emergency Plan was developed to ensure there are arrangements in place to manage hazards in the event of an accident or incident in the Reactor Facility. It identifies the responsibilities of ANSTO staff in responding to accidents and incidents at the Reactor Facility. This Plan is a sub plan of the ANSTO Response Plan for Accidents and Incidents at ANSTO/LHSTC (ANSTO Response Plan).

In accordance with Facility Licence, Construction Authorisation (F0118) Schedule 4, Licence Condition 4.13, the Reactor Facility Emergency Plan has been subject to independent review.

4.2.8 Environmental Management Plan

The Reactor Facility Environmental Management Plan describes the organisational arrangements for the integration of Environmental Aspects for the Reactor Facility into existing Environmental Management Plans (EMPs) currently in place within ANSTO's Environmental Management System (EMS).

ANSTO has obtained ISO14001 certification for its EMS (17 June 2004), as required under Condition 28 of the Conditions arising from the Environmental Impact Assessment of the Proposal for the Replacement Research Reactor.

5 SPECIFIC ARPANSA REQUIREMENTS FOR OPERATION OF A CONTROLLED FACILITY

5.1 DESIGN DETAILS

The design of the Reactor Facility is described in detail in the SAR contained in Part C of this Application.

As stated in Section 4.1.6, both the ANSTO RRRP and the Contractor (INVAP) quality systems are certified to ISO 9001:2000. All activities during the construction of the Reactor Facility have been performed in accordance with these certified quality systems. In particular, all detail engineering design deliverables submitted by the Contractor have been subject to ANSTO review, verification and acceptance in accordance with the relevant quality procedures.

In addition, in the cases where structures, systems or components are items important to safety, then an additional approval has been sought from ARPANSA in accordance with ARPANS Regulation 54 and Facility Licence, Construction Authorisation (F0118) Schedule 4, Licence Condition 4.6. No item important to safety has been constructed or installed without such approval being granted.

5.2 FINAL SAFETY ANALYSIS REPORT FOR THE REACTOR FACILITY

As indicated in Section 3.3, the status of the Reactor Facility at the time of this Application is that the detail engineering and the civil construction activities are essentially complete whilst some procurement/manufacture, installation and testing activities are ongoing. Cold commissioning of the Reactor Facility is scheduled to commence in August 2005. Fuel will be loaded into the reactor and hot commissioning commenced only after receipt of a Facility Licence, Operating Authorisation for the Reactor Facility. As such, Part C of this Application contains a Safety Analysis Report (SAR) that describes the "as-built" Reactor Facility and the safety case for the operation of the Reactor Facility for the life of the facility.

The SAR will be updated to form the Final Safety Analysis Report upon completion of hot commissioning, so as to incorporate the results of all the commissioning tests that confirm that the performance of the plant lies within the safety limits described in the SAR.

5.3 OPERATIONAL LIMITS AND CONDITIONS FOR THE REACTOR FACILITY

Operational Limits and Conditions (OLCs) are a set of operating rules that form an envelope or boundary of reactor parameter values and system conditions within which the operation of the reactor is safe and the site personnel, the public and the environment are adequately protected from radiological hazards.

The OLCs are consistent with the IAEA Safety Series 35 – G1 Safety Assessment of Research Reactors and Preparation of the Safety Analysis Report (1994) and the draft Safety Standards Series Guide NS261 NS-G-4.3 Operational Limits and Conditions for Research Reactors (March 2000), supplemented by Safety Guide NS-G-2.2 Operational Limits and Conditions and Operating Procedures for Nuclear Power Plants.

Part D of this Application, containing the OLCs and their associated Bases, will be submitted separately. It should be noted that changes may be required to the OLCs on the basis of the results of hot commissioning. In addition, it is anticipated that the OLCs may be modified during the life of the Reactor Facility as operational experience is gained with the facility. Any such modifications will be performed in accordance with the appropriate procedure of modifications and will be subject to review and approval by ARPANSA as appropriate as described in the Safety Management Plan contained in Part B of this Application.

5.4 ARRANGEMENTS FOR COMMISSIONING THE REACTOR FACILITY

Commissioning is carried out to demonstrate that:

a) The plant systems and subsystems operate together in an integrated manner in accordance with the design objective and meet the performance criteria regarding operational requirements, occupational safety requirements and nuclear safety requirements.

b) The documentation is adequate for the full facility operation, describing accurately both the plant and the procedures.

c) Staff skills are appropriate to operate the plant in accordance within occupational health and safety requirements and regulatory requirements.

d) The facility performs as designed.

e) The plant interfaces appropriately with LHSTC related facilities.

f) The measurable parameters of items performing safety functions comply with the intents of design as stated in the SAR.

The Commissioning arrangements are consistent with the guidelines and recommendations of:

a) IAEA Safety Standards Series, "Commissioning of Research Reactors", Draft Safety Guide, NS259 NS-G1 draft 4, March 1999 (ex Safety Series 35-G4, "Safety in the Commissioning of Research Reactors").

b) IAEA, 50-C/SG/Q12, Quality Assurance in Commissioning.

Commissioning results in an operational system, i.e. all components tested and verified to be in accordance with their design intent, operating and maintenance procedures available and in place and the operations staff able to operate a fully operational reactor facility.

Details of the arrangements for commissioning the Reactor Facility are contained in Part E of this Application, specifically in the form of the Commissioning Plan previously submitted to ARPANSA as part of the submission in response to Facility Licence, Construction Authorisation (F0118), Schedule 4, Licence Condition 4.7.

5.5 ARRANGEMENTS FOR THE PARALLEL OPERATION OF THE RRR AND HIFAR

ANSTO assumes full responsibility for nuclear and radiation safety from the time that fuel is loaded into the core. From that time forward, the Reactor Facility shall meet minimum shift staffing requirements at all times. The organisational structure shall be in accordance with the Commissioning Plan (see Part E of this Application).

Hot commissioning will commence from that time and will continue into steady state nominal full power operation. This sequence will take place over a period of up to six months. During that time ANSTO intends to continue operation of HIFAR as required.

ANSTO appreciates the need for experienced personnel in support of commissioning and initial reactor operations and will ensure that personnel with appropriate reactor operating experience are available during, and subsequent to, hot commissioning.

6 COMPLIANCE

The following is a checklist of compliance with ARPANSA information requirements relevant to obtaining a Facility Licence, Operating Authorisation for the Reactor Facility.

ARPANSA Requirements and Reference	ANSTO Application section
ARPANS Act 1998, Section 30	Complete Application
ARPANS Regulation 39, Schedule 3, Part 1,	
Item 1: Applicant details	Part A of Application Form
Item 2: Purpose of the facility	Section 2 of this document (RRRP-7200-EBEAN-001) and Chapters 1 and 11 of the SAR in Part C of this Application

ARPANSA Requirements and Reference	ANSTO Application section
Item 3: Description of the facility and its site	Section 3 of this document (RRRP-7200-EBEAN-001) and Chapters 2, 3, 4, 5 , 6, 7, 8, 9, 10, 11 and 12 of the SAR in Part C of this Application
Item 4: Facility management plans	Section 4.2 of this document (RRRP-7200-EBEAN-001) and the plans and arrangements in Part B of this Application
Item 15: Design details	Section 5.1 of this document (RRRP-7200-EBEAN-001) and Chapters 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 of the SAR in Part C of this Application
Item 16: Final safety analysis report	Section 5.2 of this document (RRRP-7200-EBEAN-001) and the SAR in Part C of this Application
Item 17: Operational Limits and Conditions	Section 5.3 of this document (RRRP-7200-EBEAN-001), Chapter 17 of the SAR in Part C of this Application and Part D of this Application
Item 18 : Arrangements for Commissioning	Section 5.4 of this document (RRRP-7200-EBEAN-001), Chapter 15 of the SAR in Part C of this Application and Part E of this Application
Item 19 : Arrangements for Operation	Section 4.2 of this document (RRRP-7200-EBEAN-001), the plans and arrangements in Part B of this Application and Chapters 13 and 18 of the SAR in Part C of this Application
ARPANSA Facility Licence Application Pack, Edition 1, March 1999 **ARPANSA Licence Conditions Handbook, Part 4 – Standard Licence Conditions for Facility Licences** **ARPANSA Facility Licence, Construction Authorisation (F0118), Schedule 4 – Licence Conditions**	Application Part A (RRRP-7200-EBEAN-001) Section 4.2.1 of this document (RRRP-7200-EBEAN-001) and the plans and arrangements for effective control of the Reactor Facility in Part B of this Application Reports on Compliance with Construction Licence Conditions submitted quarterly to ARPANSA. Report No.6 for the quarter ending June 2004 was submitted to ARPANSA 4 August 2004.

7 DEFINITIONS

The following terms are defined for the purpose of this Application.

The **Reactor Facility;** or the **Replacement Research Reactor**	The **Reactor Facility** means the multipurpose research reactor intended to 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 **Project**	The **Project** means all activities necessary to obtain the requisite approvals and procurement to achieve routine operation of the replacement reactor facility in 2006, as described in the project management plan.
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, as shown on Figure 1.
The **Lucas Heights Science and Technology Centre**	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.
The **buffer zone**	A mostly circular area of radius 1.6 kilometres, centred on the existing HIFAR facility, within which land use restrictions apply and all residential development is excluded.
Draft EIS	The Draft Environmental Impact Statement (Volume 1), including Appendices (Volume 2), prepared by PPK/ANSTO and released for public comment on 17 August 1998. Referred to as Volumes 1 and 2 of the EIS.
Supplementary EIS	The Supplement to the Draft Environmental Impact Statement (Volume 3), including Appendices, prepared by PPK/ANSTO in response to public comments received on the Draft EIS and sent to Environment Australia on 18 January 1999. Referred to as Volume 3 of the EIS.
EIS	The EIS includes the Draft EIS Volumes 1 and 2 and the Supplement EIS Volume 3.