Australian Government

Australian Radiation Protection and Nuclear Safety Agency

REGULATORY ASSESSMENT REPORT

Assessment of Facility Licence Application A0279 from the

Australian Nuclear Science and Technology Organisation (ANSTO)

to construct the

ANSTO Interim Waste Store (IWS) at Lucas Heights Science and Technology Centre

Regulatory Services Branch

R13/06576

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EXECUTIVE SUMMARY

On the 16th of April 2013 the CEO of ARPANSA received a licence application (application number A0279) from the CEO of ANSTO requesting approval to construct the nuclear installation known as the ANSTO Interim Waste Store (IWS) at the Lucas Heights Science and Technology Centre (LHSTC). This was received at the same time as the application for a licence to prepare a site for the IWS (application number A0277). The licence to site the IWS at LHSTC, Facility Licence No F0277, was granted on 29 November 2013. The proposed nuclear installation is to be a purpose-built store for housing intermediate level solid radioactive waste returning from France, and potentially also from the United Kingdom (UK), following reprocessing of fuel assemblies used in the closed HIFAR research reactor. The application assumes that waste returning from the UK will be stored in the IWS, and assumes the waste will be in the bounding form i.e., in a cemented waste form. It is proposed that these wastes will be stored in the IWS until the national Radioactive Waste Management Facility (NRWMF) is constructed and operational at which time they will be moved to that facility.

The application describes the construction safety assessment of the IWS, plans and arrangements for managing safety, and other relevant information such as the facility design information, requirements for an operating licence, a Preliminary Safety Analysis Report (PSAR), a construction plan and schedule, and testing and commissioning of safety related items.

The radioactive waste returning from France will be immobilised in a vitreous form and transported/stored in an engineered shielded dual storage and transport container known as the TN81. In addition, technological waste will be returned from France cemented within steel drums. The waste returning from the UK could be either in vitrified or cemented form. Discussions on the exact waste form returning from the UK are currently in progress with the UK and Scottish governments, and should be finalised by the end of 2013.

The proposed facility is an above-ground building called the Interim Waste Store. The application seeks approval for construction of the proposed IWS at the LHSTC between the existing building 64 and building 19, just to the north of building 61, and will require demolition of building 63.

When considering the licence application and making a decision as to whether to issue a licence, the CEO of ARPANSA is required to take into consideration certain matters prescribed in the *Australian Radiation Protection and Nuclear Safety Act 1998* (the Act) and the Australian Radiation Protection and Nuclear Safety Regulations 1999 (the Regulations). ARPANSA assessors have prepared this Regulatory Assessment Report (RAR) for consideration by the CEO of ARPANSA in making such a decision.

This RAR is based on the assessment of the information described in the application A0279. The plans and arrangements for safety and other relevant information about the construction of the facility have been reviewed against the requirements in the Australian Radiation Protection and Nuclear Safety Regulations 1999, and other pertinent guidelines and principles such as:-

- ARPANSA, Regulatory Assessment Principles for Controlled Facilities, ARPANSA, Rev 1, RB-STD-42-00, October 2001.
- ARPANSA, Regulatory Guide: Plans and Arrangements for Managing Safety (RG), ARPANSA, v4, OS-LA-SUP-240B, Jan 2013.

- ARPANSA, Regulatory Guide: Licensing of Radioactive Waste Storage and Disposal Facilities, ARPANSA, v2, OS-LA-SUP-240L, March 2013.

The ARPANSA assessor finds that the application has acceptably addressed the matters needing to be taken into account by the CEO of ARPANSA in deciding whether to issue a licence authorising ANSTO to construct the IWS. The ARPANSA assessor concludes that the application includes suitable plans and arrangements to ensure that the nuclear installation may be constructed without undue risk to the health and safety of people and the environment. The ARPANSA assessor recommends that the CEO of ARPANSA issues a facility licence to ANSTO authorising construction of the proposed IWS facility at the LHSTC.

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1. INTRODUCTION

On 15 April 2013, ANSTO applied for a facility licence under subsection 32(1) of the Act to construct a proposed Interim Waste Store (IWS) at the Lucas Heights Science and Technology Centre (LHSTC).

The proposed IWS is a nuclear installation as defined in regulation 7 and further described in Item 17(a) in Schedule 3A of the Regulations.

Facility licence F0277 was issued to ANSTO on 29 November 2013 to prepare a site for the IWS.

1.1 Purpose

The purpose of this report is to document the assessment of information contained in ANSTO's application against the criteria set out in the *Australian Radiation Protection and Nuclear Safety Act 1998* (the Act) [1] and the Australian Radiation Protection and Nuclear Safety Regulations 1999 (the Regulations) [2]. Consideration is given to the matters to be taken into account by the CEO under sub-section 32(3) of the Act, that is, international best practice in radiation protection and nuclear safety, and those matters set out in regulation 41 and Schedule 3 Part 1 of the Regulations.

1.2 Receipt of application

In accordance with the requirements of the Act, ANSTO submitted an application [3] for a nuclear installation licence on 15 April 2013 which was received by ARPANSA on 16 April 2013. A copy of the licence application is posted on the ARPANSA website, but excludes commercially sensitive information which relates to AREVA technology. The application is in an acceptable form and was accompanied by the appropriate fee.

As required by regulation 40 of the Regulations, the CEO of ARPANSA published a notice in the Australian Government Gazette No. GN 18 and the Australian newspaper on 8 May 2013, notifying the receipt of a facility licence application from ANSTO and of his intention to make a decision on the application.

Additional information subsequently obtained from the applicant forms part of the application.

1.3 Assessment process

The assessor has relied on the following documents and information:

- The information contained in the initial application.
- Information obtained from the applicant following receipt of the application.
- Information obtained at meetings and discussions with the applicant.
- Other documents referred to in the body of this report.

The following documents have been used in the assessment of this application:

- The Australian Radiation Protection and Nuclear Safety Regulations [2].
- ARPANSA, Regulatory Assessment Principles for Controlled Facilities, ARPANSA, Rev 1, RB-STD-42-00, October 2001 [4].
- ARPANSA, Regulatory Guide : Plans and Arrangements for Managing Safety (RG), ARPANSA, v4, OS-LA-SUP-240B, Jan 2013 [5].
- ARPANSA, Regulatory Guide: Licensing of Radioactive Waste Storage and Disposal Facilities, v2, OS-LA-SUP-240L, March 2013 [6].

ARPANSA has kept the Nuclear Safety Committee[1] (NSC) informed of progress on this matter throughout the assessment process. The CEO of ARPANSA requested high level advice from the NSC on the ANSTO Interim Waste Store licence application. Formal advice was received from the NSC on 8 May 2013 and 22 November 2013.

2. REVIEW OF INFORMATION

2.1 General information

This section describes the review of information provided in the application and information subsequently received from the applicant.

2.1.1 Applicant information [item 1]

Item 1 of Part 1 of Schedule 3 of the Regulations requires the applicant to provide the applicant's full name, position and business address.

The application was made by Dr Adrian Paterson, CEO of ANSTO. ANSTO is part of the Department of Industry portfolio. Mr Con Lyras, General Manager, Engineering and Capital Programs is named as the nominee authorised by the CEO of ANSTO in relation to the application. The application also provides contact details of the applicant's Radiation Safety Officer.

The address of the proposed nuclear installation is Lucas Heights Science and Technology Centre, New Illawarra Road, Lucas Heights NSW. The nuclear installation will be located within the LHSTC

[1] The Nuclear Safety Committee is established under the *Australian Radiation Protection and Nuclear Safety Act 1998* to inter alia "advise the CEO and the Council on matters relating to nuclear safety and the safety of controlled facilities'. Members are: the CEO of ARPANSA; a person to represent the interest of the general public; a representative of the Radiation Health Committee; a person to represent the local government or the local administration of an area affected by a matter related to the safety of a controlled facility; and up to 8 other members.

between existing buildings 64 and 19, just to the north of building 61. It will require demolition of building 63.

Conclusion

The assessor considers that the information about the applicant, required under Item 1 of Part 1 of Schedule 3 of the Regulations [2], has been provided in the application.

2.1.2 Description of purpose of the facility [Item 2]

Item 2 of Part 1 of Schedule 3 of the Regulations requires the applicant to provide a detailed description of the purpose of the facility.

The proposed IWS facility is designed to hold one TN81 transport/storage container stored vertically. Floor space is also provided for the ISO container that will hold the technological waste in the form of six cemented drums in shielded over pack concrete containers. The available floor space is also adequate to manage Australia's intermediate level waste (ILW) returning from the United Kingdom (return timing to be renegotiated) should the National Radioactive Waste Management Facility (NRWMF) not be operational at that time.

Conclusion

The assessor considers that the purpose of the facility described in the application is adequate.

2.1.3 Detailed description of the facility and site [Item 3]

Item 3 of Part 1 of Schedule 3 of the Regulations require the applicant to provide a detailed description of the facility and site for the proposed facility.

The proposed IWS is a temporary facility designed to house the ILW generated from the reprocessing of HIFAR used nuclear fuel. The definition of ILW is given in Annex 1 of the ARPANSA Radiation Protection Series No 20 Safety Guide for Classification of Radioactive Waste [7]. Annex 1 classifies the radioactive waste from the reprocessing of HIFAR used fuel as intermediate level solid waste. Eventually the ILW will be transported to the planned NRWMF. This facility is expected to be constructed and capable of receiving waste by 2020.

The proposed IWS will be approximately 840 m^2 in area, with a footprint of 28 metres by 30 metres and 17 metres high and is described in ANSTO document IWS-C-LA-Ca [3], Interim Waste Store Facility Design information. The perimeter walls will be precast concrete panels approximately 5 metres high fixed to a steel portal frame. The walls above the concrete panels, and roof, will be constructed with metal baked panels having good thermal insulation. The floor will be a concrete slab to withstand the rated loads. The facility will have access from Dalton Avenue. A 140 tonne, dangerous goods rated, overhead crane will be provided to move loads to and from transport vehicles and within the building. The design of the facility is in accordance with the Building Code of Australia, other relevant Australian Standards and ANSTO specific guidelines.

The proposed IWS will be surrounded by other ANSTO buildings, and will be approximately 350 m from the southern-most point of the fenced site; 182 m from the fence at Gate 14; and 112 m from the nearest point on the fence.

The general site characteristics for the proposed nuclear installation are given in the Siting Safety Assessment: Site Characteristics and Site Related Design Bases, IWS-S-LA-Cab, Rev 2, March 2013 which can be found as part of the ANSTO siting licence application [3].

In summary the LHSTC is situated approximately 35 km south-west of the Sydney CBD on the Woronora Plateau at an elevation of 150 m above mean sea level. The LHSTC is approximately 2 km west of the Woronora River and 8 km south of the Georges River and is surrounded by bushland for several kilometres with no significant habitation in the north-west, west and south-west quadrants. The ANSTO laboratories, and some divisional laboratories of CSIRO, are located within a 70 ha fenced area which is surrounded by a 1.6 km buffer zone. The residential suburbs of Barden Ridge and Engadine are located in the north-east to south-east sectors adjacent to the ANSTO buffer zone while the growing suburban area of Menai is located approximately 3 km to the north-east. Residential development is also proposed to the north of the site.

Conclusion

The assessor concludes that, as required under items 2 and 3, Part 1 of Schedule 3 of the Regulations [2], the application provides a satisfactory description of the purpose of the proposed facility, its design and site, summarised in sections 2.1.2 and 2.1.3 above, for the construction stage of the project.

2.2 Plans and arrangements for managing safety

Item 4 of Part 1 Schedule 3 of the Regulations [2] describes information that may be requested by the CEO and refers to plans and arrangements for managing safety of the controlled facility to ensure the health and safety of people and protection of the environment. It is expected that there are plans and arrangements that describe how the applicant proposes to manage the controlled facility.

ANSTO's plans and arrangements for managing safety and other relevant information about the construction of the IWS facility have been reviewed against the ARPANSA Regulatory Guide: Plans and Arrangements for Managing Safety (RG) [5] and the ARPANSA Regulatory Assessment Principles for Controlled Facilities (RAPS) [4]. This section briefly describes the information provided by ANSTO on its plans and arrangements and assesses the information against the relevant guidelines.

2.2.1 Effective control arrangements [Item 4(a)]

In applying for a facility licence, the applicant may nominate a person or position that would exercise effective control of the conduct for which the licence is sought, and demonstrate how the nominee would maintain that control. The nominee must have appropriate responsibility, with adequate authority and control of material, human and financial resources to ensure safety of the conduct. Ultimate responsibility and accountability remains with the applicant.

The applicant must describe the organisational arrangements for managing the safety of the conduct and dealings to ensure the health and safety of people and the protection of the environment. This should include a description of responsibilities and lines of authority, and information on a quality system covering all activities that may impact on safety.

Accountability of applicant

The licence holder or applicant is responsible for maintaining control over all aspects of conducts and dealings for which licences are sought or held, and for ensuring compliance with all applicable requirements of the ARPANS Act and Regulations. The licence holder or applicant may authorise people to carry out certain actions associated with their responsibilities under the Act, but the licence holder or applicant remains ultimately responsible (RG 1.1-1.4 [5])

The effective control plan (IWS-C-LA-D1, revision 2, March 2013) [3] including information in section 2 that describes how ANSTO management will ensure control over the construction of the IWS facility and safety of personnel and the environment during this construction. In addition, ANSTO has provided the following information in its application:

- ANSTO, through its CEO, is the applicant to ARPANSA for the construction licence authorisation being sought. The responsibility for maintaining effective control and for ensuring compliance with the ARPANS legislation during the construction of the facility has been delegated to the Nominee who is the General Manager (GM) of Engineering and Capital Programs (ECP). The Nominee is assisted by the Facility Officer for the IWS. During construction this role will be will be fulfilled by the Project Manager.

- ANSTO management will use several processes to remain informed and aware of safety during the project. Management will be informed by review of the construction licence application and by the safety approval process for the project which is described in IWS-C-LA-D2 *Safety Management Plan* [3]. The normal project reporting will include safety and this will be discussed at safety meetings. The event response system, described in the safety management plan, will rapidly inform management of safety incidents and accidents.

- ANSTO states that it follows the ARPANS legislation requirements for reporting to ARPANSA including annual and quarterly reports and the requirement for immediate reporting in the event of an accident.

The assessor considers that the application contains adequate information to satisfy the accountability guidelines 1.1 to 1.4 of the RG [5].

Organisational arrangements

An organisational structure, showing clear lines of authority and responsibility for all activities, particularly those relating to safety, training, radiation protection, operations, maintenance, modifications, quality management, radioactive waste management, security, emergency planning and emergency preparedness (RG 1.5 [5]).

The effective control plan including organisation charts for ANSTO (Figure 1, IWS-C-LA-D1)[3]; ECP Division (Figure 2, IWS-C-LA-D1)[3]; structure and accountability of the Head of Nuclear Services and Chief Nuclear Officer (Figure 3, IWS-C-LA-D1)[3]; and the IWS project (Figure 4, IWS-C-LA-D1)[3].

The construction of the IWS facility will be managed as a project within ANSTO using a matrix project organisation structure with staff drawn from ECP and other divisions. The project organisation is shown in Figure 4 of the effective control plan. The Project Manager has formed the project team and is executing the project following the Major Projects Delivery Office (MPDO) procedures and with funds approved by senior management.

ANSTO has also provided the following information in its application:

- Ultimate responsibility for the IWS facility rests with the CEO of ANSTO who has delegated responsibilities to senior managers. The GM, ECP is both the delegated Nominee for IWS and capital projects, including the IWS construction project. When completed, ANSTO Waste Operations will operate the facility. The Head Nuclear Services has a dual role as Chief Nuclear Officer and is also Chair of the Safety Assurance Committee (SAC).

The dual role of the Chief Nuclear Officer has been assessed previously by ARPANSA and found to be acceptable.

The assessor considers that the application contains adequate information to satisfy guideline 1.5 of the RG [5].

Communication network

A communication network from management to staff, and the feedback system to management, showing how it will result in an open exchange of information at and between all levels of the organisation (RG 1.6 [5]).

The communication network and feedback system from management to staff will follow usual lines of responsibility within a hierarchical organisation like ANSTO. This can be seen in the organisational charts shown in Figures 1 to 4 of the effective control plan. Communication between management and staff actively involved in the construction phase of the IWS facility will be governed by the matrix project structure.

Under the Project Manager is the ILW Store and Road Works project manager who will act as construction supervisor with site responsibility for the siting and construction activities once construction has been approved. The Project Manager is also the Facility Officer and will report to the Nominee and Licensing Officer on ARPANSA licensing issues. Support and indirect supervision is provided by the Radiation Protection Adviser (RPA) and other specialists. RPA, Health Physics Surveyor (HPS) and Work Health and Safety (WHS) support staff provide guidance and advice but are not shown on the project organisation chart because they report through their line management in Nuclear Services and Human Resources and Work health and Safety. Note however that they are expected to provide monitoring, dose survey and other regular reports to the project.

The assessor considers that the application contains adequate information to satisfy guideline 1.6 of the RG [5].

Responsibilities

Defined responsibilities and lines of communication with other parts of the organisation and with external organisations, under all operating conditions (RG 1.7 [5]).

The organisational chart for the IWS facility project is given in Figure 4 of the effective control plan (IWS-C-LA-D1)[3]. This chart shows the relationships and lines of communication between the IWS Steering Committee, the Project Manager, the Procurement and Security Operations Managers, Manager Nuclear Services, Regulatory Manager, Facility and Roadworks including the principal contractor, Communications and Public Liaison, Logistics and Procurement, and Regulatory and Engineering.

The assessor considers that the application contains adequate information to satisfy guideline 1.7 of the RG [5].

Delegations

Appropriate delegations in relation to operational and financial matters (RG 1.8 [5]).

The ANSTO project management and approval processes for projects ensure there is sufficient funding available for the necessary equipment and people resources. The funding is allocated by the ANSTO Capital Investment Committee (CIC) comprising senior management and the projects are monitored throughout their lifecycle by the CIC.

On approval the funds are made available to the project manager and staff. All external purchases of items and services, including additional training, are through the ANSTO Procurement Section and follow the requirements of the Government Procurement Guidelines.

The assessor considers that the application contains adequate information to satisfy guideline 1.8 of the RG [5].

Deputising arrangements

Deputising arrangements for key safety personnel in their absence (RG 1.9 [5]).

In response to further information requested by ARPANSA, ANSTO has stated that it has a delegations manual approved by the board and CEO. When a nominated individual is selected to deputise for another individual, all the key delegations are transferred to that individual. Furthermore, arrangements will ensure that the person deputising is suitably qualified and experienced to undertake the duties for which they are deputising.

The assessor considers adequate information is provided to satisfy guideline 1.9 of the RG [5].

Control and supervision of contractors

Defined responsibilities and lines of communication relating to the control and supervision of contractors (RG 1.10 [5]).

ANSTO has supplied information in its application that contractors will report through their supervisor/manager to the construction supervisor who is an accredited contractor supervisor as per ANSTO's WHS Management System.

The assessor considers that the application contains adequate information to satisfy guideline 1.10 of the RG [5].

Defined roles and responsibilities

A description of the precise roles of individual positions, particularly those relating to radiation protection and nuclear safety, as defined in job descriptions, profiles or similar documents (RG 1.11 [5]).

In section 3 of the effective control plan (IWS-C-LA-D1)[3] ANSTO defines the roles, responsibilities and accountabilities of Head Nuclear Services and the Chief Nuclear Officer. The Radiation Protection Services group has the specialist Radiation Protection Advisers (RPAs) who have developed the construction and commissioning radiation protection plan (IWS-C-LA-D3)[3] and have input to other plans where radiation safety is involved. The group also provides the Health Physics Surveyors (HPS) who conduct radiological surveys and provide close support to the work teams. The dosimetry services are also within this group. The Chief Nuclear Officer is also Chair of the Safety Assurance Committee (SAC) which is the review and approval body for all safety significant changes and projects.

Although job descriptions have not been provided for specific roles, the assessor considers that there are adequate descriptions provided for the key roles of the Head Nuclear Services and Chief Nuclear Officer who have responsibility for the areas of radiation protection and nuclear safety through the SAC.

The assessor considers that the application contains adequate information to satisfy guideline 1.11 of the RG [5].

Key safety positions

A statement of responsibilities for key safety positions and the required training, accreditation, organisation for individuals to adequately organise these positions. (RG 1.12 [5])

The training of key safety positions is described in section 5 of the safety management plan (IWS-C-LA-D2)[3]. The Radiation Protection Advisers are recruited with the necessary knowledge, skills and experience or are trained within ANSTO, and authorised within ANSTO. The Health Physics Surveyors are given comprehensive theoretical and practical training and are authorised within ANSTO.

The Health and Safety Services section within Human Resources and Work Health and Safety coordinates, manages and maintains all WHS related courses onsite including all inductions required for staff and contractor access.

Workers entering construction work areas must hold a WorkCover issued white card and be inducted to the site. Visitors must be escorted by an authorised ANSTO worker or contract partner

who must provide a local area induction and the required personal protective equipment (PPE) required for entry.

The assessor considers that the application contains adequate information to satisfy guideline 1.12 of the RG [5].

Defined interfaces

The activities and interfaces between different individuals or groups involved in a single process are planned, controlled and managed in a manner that ensures effective communication and clear assignment of responsibilities. (RG 1.13 [5])

The organisational chart for the IWS facility project is given in Figure 4 of the effective control plan (IWS-C-LA-D1)[3]. This chart shows the relationships and lines of communication between the IWS Steering Committee, the Project Manager, the Procurement and Security Operations Managers, Manager Nuclear Services, Regulatory Manager, Facility and Roadworks including the principal contractor, Communications and Public Liaison, Logistics and Procurement, and Regulatory and Engineering.

Section 3 of the effective control plan describes the matrix staffing arrangements for the IWS Project, and describes responsibilities of the project teams.

The assessor considers that the application contains adequate information to satisfy the guideline 1.13 of the RG [5].

Performance evaluation

Systematic evaluation of staff performance benchmarked against achievable goals. (RG 1.14 [5])

ANSTO has a process for establishing performance expectations through its Annual Performance and Effectiveness Appraisals (APEA) process. This process establishes goals and expectations for the year ahead, and provides formal six monthly and annual performance reviews against the agreed goals and expectations. Safety behaviour is one of the key aspects of the APEA process.

The assessor considers that adequate information has been provided to address guideline 1.14 of the RG [5].

Periodic review

Periodic review of the adequacy of the organisational structure, including staffing and resources related to conducts and dealings. (RG 1.15 [5])

The IWS facility construction project has been established in a matrix project organisation structure with staff drawn from ECP and other divisions. The Project Manager has formed the project team and is executing the project following the Major Projects Delivery Office procedures and with funds approved by senior management. These organisational arrangements are reviewed periodically.

In addition, section 5 of the effective control plan states that the ANSTO project management and approval processes for projects ensures there is sufficient funding available for the necessary

equipment and people resources. The funding is allocated by the ANSTO Capital Investment Committee (CIC) comprising senior management and the projects are monitored throughout their lifecycle by the CIC.

The assessor considers that the application contains adequate information to satisfy guideline 1.15 of the RG [5].

Change management

A defined process to ensure that implementation of organisational change is planned, controlled, communicated, monitored, tracked and recorded in such a way that safety is not compromised. Organisational change is evaluated and classified according to safety importance. (RG 1.16 & 1.17 [5])

Following a request for further information regarding change management, the following information was supplied by ANSTO – organisational changes with a potential impact on safety are referred to the Safety Assurance Committee (SAC) for review. To ensure communication of changes, ANSTO staff forums are held, and information is posted on the ANSTO intranet. In addition, information is exchanged at toolbox talks and monthly management meetings.

The assessor considers that adequate information has been provided to address guidelines 1.16 and 1.17 of the RG [5].

Legislative compliance

Established liaison with ARPANSA and other statutory authorities for the purposes of considering, understanding and achieving compliance with the requirements of respective legislation, licence conditions, and any obligations of Australia under international treaties. (RG 1.18 [5])

Section 3 of the effective control plan states that there will be ongoing liaison with the regulators including ARPANSA through the Regulatory Affairs Manager from the Governance, Risk and Compliance Group within the Office of the CEO.

Section G of the application states that ANSTO will adopt relevant safety requirements and guidelines, particularly the IAEA's Safety Guide for Storage of Radioactive Waste (WS-G-6.1, 2006) [8] and IAEA Safety Requirements for Safe Transport of Radioactive Material (TS-R-1, 2009) [9]. ANSTO states it is also committed to protecting the environment, and this is demonstrated through its certification to the international environmental management system standard, ISO 14001.

The assessor considers that the application contains adequate information to satisfy guideline 1.18 of the RG [5].

Information & knowledge management

Provision for management of organisational information and knowledge. (RG 1.19 [5])

Section 10 of the safety management plan (IWS-C-LA-D2) [3] states that project information and documentation is stored on ANSTO computer servers and in relevant paper files. Project staff have the appropriate access to this information.

The ANSTO safety arrangements are within the ANSTO AS/NZS ISO 9001:2008 (ISO 9001) certified systems and this is important to ensure there is appropriate reporting and storage of records. General requirements for safety records are given in S-P-003 Control of Records [3] which details the storage locations, retention periods and responsibilities for maintaining the records. These records include design and operational information, dosimetry records, survey results, safety assessments, safety training records and event reporting as examples.

The assessor considers that the application contains adequate information to satisfy guideline 1.19 of the RG [5].

Maintenance of corporate knowledge

An adequate level of corporate knowledge is maintained within the organisation (for example: with regard to staff retirement and resignation). (RG 1.20 [5])

Following a request for further information by ARPANSA regarding retention of corporate knowledge, the following information was supplied by ANSTO – ANSTO operates a Business Management System (BMS) which is accredited to ISO 9001. Management of records is a key component of the BMS. In addition a project has been initiated within ANSTO known as the Managing Knowledge Initiative which is aimed at managing knowledge as a strategic resource, improving information sharing and improving record management processes.

Although ANSTO's response does not actually address staff resources or succession management, the assessor considers that the intent of guideline 1.20 of the RG [5] is adequately addressed.

Management system

The licence holder or applicant is responsible for ensuring that a management system, consistent with current AS/NZS ISO standards and IAEA Safety Standards, and commensurate with the type of controlled facility, controlled apparatus or controlled material is developed, implemented and maintained. (RG 1.21 – 1.25 [5], RAPS 13 – 14 [4])

Section 4 of the effective control plan [3] describes the ANSTO management system and how it has policies to cover all aspects of its operations, including Occupational Health, Safety and Environment, which are periodically reviewed. The policies are available on the ANSTO intranet and accessible to all staff. There are regular staff forums held by the CEO and the divisions at which safety issues are discussed to reinforce the policies. Safety training programs further expand and explain the intent of the policy.

Project documents are developed in accordance with ISO 9001. The effectiveness of the management systems is monitored and maintained by the audit programs for the ISO certifications.

The assessor considers that the application contains adequate information to describe the applicant's management system to satisfy guidelines 1.21 – 1.25 of the RG [5] and RAPS principles 13 – 14 [4].

Resources

The licence holder or applicant is responsible for ensuring that adequate and appropriate human, financial and material resources are provided to effectively implement the plans and arrangements for radiation protection and nuclear safety and to maintain effective control over conducts and dealings. (RG 1.26 – 1.30 [5])

Section 5 of the effective control plan [3] describes how the ANSTO project management and approval processes ensure that there is sufficient funding available for necessary equipment and human resources. In addition this funding is reviewed during the life of the project by the Capital Investment Committee.

The assessor considers that the application contains adequate information to describe the applicant's management of resources to site the IWS facility to satisfy guidelines 1.26 – 1.30 of the RG [5].

Conclusion

The assessor concludes that the application contains adequate information to describe the effective control arrangements during the construction of the IWS facility.

2.2.2 Safety management plan [Item 4(b)]

The application should include a safety management plan that demonstrates that safety management practices are in accordance with internationally accepted principles and practices and duty of care obligations.

Safety approvals system

A summary of the ANSTO safety approvals system is given in section 5.6 of the Preliminary Safety Analysis Report (PSAR) of the construction licence application IWS-C-LA-Cd [3]. The ANSTO Safety Assurance Committee reviewed and approved the plans and arrangements for the construction of the IWS facility in SAC 1932 on 27 March 2013 [3].

Safety culture

The licence holder or applicant is responsible for establishing safety as the organisation's highest priority, consistent with international best practice in radiation protection and nuclear safety and overriding, if necessary, the demands of production or project schedules (RG 2.1 – 2.19 [5], RAPS 1,3, 6-9 [4]).

ANSTO provides information on safety culture in section 2 of the safety management plan (IWS-S-LA-D2) [3].

The safety culture during pre-operational phases is important to the ultimate safety of the operational facility. The initial design and subsequent changes or compromises made during construction can impact on the safety of the operating plant. At a high level ANSTO has sought to isolate safety policies from commercial pressures by funding being provided by the Capital Investments Committee (CIC) and safety approvals being given by the separate Safety Assurance

Committee (SAC). This is important as it insulates the project from the production and project pressures that it will invariably encounter.

ANSTO has an immediate challenge to establish a cross-organisational safety culture in a project which will have a high reliance on contractors during the construction phase. Safety culture focus should cut across direct construction safety to quality management to ensure that the facility can be operated safely through meeting high standards and specifications. ANSTO has shown the capacity to achieve this through projects such the decommissioning of the MOATA reactor. Regulatory oversight during construction can be applied to verify that this capacity remains and is applied to the IWS.

In regard to leadership for safety, many aspects are difficult to gauge from the application due to the characteristics of safety leadership rather than a weakness in the application itself i.e. some leadership attributes are better observed than prescriptively written. It is stated in the application that an important aspect of safety culture is for people to have a questioning attitude and adopt a prudent approach to work with conservative decision making. Appropriate training and awareness is instilled by safety briefings, toolbox talks, safety inspections and use of the STAR principle (Stop, Think, Act, Review). This principle is well established among ANSTO staff and ANSTO has been successful previously at promoting it to other workers.

The ECP Business Management System (BMS) monitors safety indicators, for all projects, that are designed to improve operational safety performance. The safety policy and arrangements are readily available to all staff via the intranet, and are subject to regular review. All safety events/incidents can be captured, reported, and investigated if necessary by the ANSTO Event Management Process. This system is well-developed and provides an effective mechanism for workers to raise issues including safety and quality to management. This system links into ANSTO organisational learning and change management systems and will be accessible to both ANSTO staff and contractors.

Finally, safety issues and learning are communicated to staff in several ways. Toolbox talks are the main forum for the siting of the facility itself. Feedback to the MPDO and ECP management will occur through the Project Manager both informally and through project reports. There is also a direct route to management for safety related issues.

ANSTO states that at the organisational level, the CEO holds regular forums for all staff and promotes a safety theme.

It is considered by the assessor that there is adequate information to satisfy guidelines 2.1 – 2.19 of the RG [5] and RAPS principles 1, 3, 6-9 [4].

Administrative arrangements

The licence holder or applicant is responsible for ensuring that the organisation has recognised its responsibility for ensuring the health and safety of people and the protection of the environment (RG 2.20 – 2.29 [5]).

Administrative arrangements to help ensure the health and safety of people and the protection of the environment are described in section 3 of the safety management plan (IWS-C-LA-D2) [3].

Following a request for further information, ANSTO provided additional material on administrative arrangements for ensuring the health and safety of people and protection of the environment. In particular additional information on the exposure of young people and pregnant employees was provided.

The assessor considers that the applicant has provided adequate information in the safety management plan to satisfy guidelines 2.20 – 2.29 of the RG [5].

Safe premises, buildings and equipment

The licence holder or applicant is responsible for ensuring that management has recognised their obligations to provide a safe working environment (RG 2.30 – 2.37 [5], RAPS 10 – 12 [4]).

Section 4 of the safety management plan (IWS-C-LA-D2)[3] describes aspects of safe premises, building and equipment. It is stated that the building will conform to the Building Code of Australia, and that ANSTO will adopt relevant safety requirements and guidelines, particularly the IAEA Safety Guide WS-G-6.1 Storage of Radioactive Waste [8].

Safe entry and exit from the site are described in the site security plan (IWS-C-LA-D5)[3]. It is stated that during the construction phase no nuclear or radiological material is present, and therefore, during construction, safety management is limited to conventional occupational and industrial hazards. In addition it is stated that during the siting and construction phases only those persons with requisite training and need will be granted access to the IWS construction site, and a list will be kept by the construction supervisor of all who access the site. A safe work permit system will be employed so that specific tasks such as excavation and electrical isolations will be controlled.

The assessor concludes that the information provided adequately addresses guidelines 2.30 -2.37 of the RG [5] and RAPS principles 10 – 12 [4].

Competency, training and supervision

The licence holder or applicant is responsible for ensuring that arrangements are in place and implemented, for identifying and transferring the knowledge and skills needed by controlled persons to ensure that all conducts and dealings are performed or supervised by competent and authorised staff. In addition the licence holder or applicant is responsible for ensuring that visitors who may be exposed to any radiation arising from conducts and dealings receive appropriate supervision and instruction (RG 2.38 – 2.55 [5]).

Section 5 of the safety management plan (IWS-C-LA-D2) [3] provides details of competency, training and supervision. ANSTO has processes which ensure that potentially hazardous work is undertaken and supervised by appropriately trained staff. This begins at the recruitment stage where staff are selected with the technical and professional experience for the role. Health Physics Surveyors are given comprehensive theoretical and practical training and are authorised at ANSTO. Workers who are assigned to do specialised tasks will be provided with task-specific training prior to undertaking the task.

As well as radiation safety training, conventional work, health and safety training is provided to staff by the Health and Safety Services section. Workers entering a construction work site must possess a

WorkCover issued white card, and must be inducted to the site. All records of training are kept in the ANSTO training management system.

The assessor concludes that adequate information is provided to satisfy guidelines 2.38 – 2.55 of the RG [5].

Control of visitors, contractors and other persons

The licence holder or applicant is responsible for ensuring that duty of care obligations have been met with regard to the safety of anyone entering a workplace where a conduct or dealing is undertaken. This includes contractors, their employees and visitors (RG 2.56 – 2.63 [5]).

Section 6 of the safety management plan (IWS-C-LA-D2) [3] states that ANSTO recognises it has a duty of care to all workers, not only employees but also other categories e.g. contractors and visitors. Under WHS legislation contractors have the same status as employees. Only staff with appropriate safety training and supervision will be given access to the site. All PPE required for work areas will be provided at a suitable location near to the entry to the area where the PPE is required. Within work areas signage exists specifying the PPE required. Entry in radiation/contamination areas is through barriers. Only staff and contractors with the appropriate training will be given access to these areas.

The assessor considers that adequate information to satisfy guidelines 2.56 – 2.63 of the RG [5] is provided.

Control of hazards

The licence holder or applicant is responsible for ensuring that all hazards associated with the conducts and dealing are appropriately controlled (RG 2.64 – 2.69 [5]).

Section 7 of the safety management plan states that the main processes within ANSTO for control of hazards is through the Safe Work Method and Environmental Statements (SWMES) prepared for individual tasks and the overall review of projects by the Safety Assurance Committee (SAC). These ensure that external consultants and safety committees are involved in the internal safety review process, the hazard identification process and developing arrangements for their control.

The assessor considers that the application provides adequate information to satisfy guidelines 2.64 -2.69 of the RG [5].

Deviations, anomalies, incidents and accidents

The licence holder or applicant is responsible for ensuring that arrangements are in place and are implemented for dealing with deviations, anomalies, incidents and accidents arising from the conducts and dealings. The licence holder or applicant is also responsible for ensuring that these arrangements are regularly reviewed and updated in accordance with best international practice (RG 2.70 – 2.74 [5]).

Section 8 of the safety management plan describes how deviations, incidents and accidents are captured in the WHS system. The event reporting systems are described in the ANSTO guide AG-2372 Event Management Process Guide. This also captures near misses. This involves a follow-up

process with initial investigation and a later review by management. In addition, ANSTO also has requirements to report to ARPANSA, and these are described in their internal guide AG-2376 Routine Reporting to ARPANSA.

The assessor considers there is adequate information to satisfy guidelines 2.70 – 2.74 of the RG [5].

Audits and reviews

The licence holder or applicant is responsible for ensuring that arrangements are in place and are implemented for the assessment of all aspects of the safety management system through audits and reviews to ensure compliance with the ARPANS legislation and consistency with international best practice (RG 2.75 – 2.79 [5], RAP 41 [4]).

Section 9 of the safety management plan describes arrangements within ANSTO to undertake audits and reviews in the Work Health Safety and radiation protection services areas. The Work Health Safety maintains ISO 9001 accreditation which requires regular management reviews and audits.

The radiation protection arrangements for the project are described in IWS-S-LA-D3 [3], the radiation protection plan. The project team will monitor the effectiveness of this plan, taking into account dose, contamination, dosimetry and survey results and update the plan accordingly.

The assessor considers the information provided to be adequate to satisfy guidelines 2.75 – 2.79 of the RG [5] and RAP 41 [4].

Records and reporting

The licence holder or applicant is responsible for maintaining and retaining records relevant to health and safety information associated with conducts and dealings (RG 2.80 – 2.85 [5]).

Section 10 of the safety management plan describes the arrangements for record keeping and reporting. The ANSTO safety arrangements are within the ANSTO certified ISO 9001 system which ensures there is appropriate reporting and storage of records. The requirements for safety records and reporting are described in the Work Health Safety Quality manual. General arrangements for safety records are given in the document S-P-003 Control of Records [3] which details storage locations, retention periods and responsibilities for maintaining the records.

Medical records associated with injuries are maintained confidentially by the ANSTO Health Centre.

The assessor considers the application provides adequate information to satisfy guidelines 2.80 to 2.85 of the RG [5].

Conclusion

The assessor concludes that the application contains a safety management plan and this and other documents contained within the application contain adequate information to describe the safety management practices during the construction of the IWS facility. Further the assessor concludes that the safety management practices are in accordance with internationally accepted principles and practices and duty of care obligations.

2.2.3 Radiation protection plan [Item 4(c)]

The applicant is responsible for ensuring that arrangements are in place for meeting their responsibilities towards radiation protection and nuclear safety (RG 3 [5], RAPS 57 – 62 [4]).

Principles of radiological protection

The licence holder or applicant is responsible for ensuring that plans and arrangements are in place and implemented for the safe management of conducts and dealings in accordance with international best practice in radiological protection (RG 3.1 – 3.6 [5]).

Sections 3.1, 3.2, and 3.3 of the radiation protection plan (IWS-C-LA-D3) [3] provide adequate information on justification, optimisation and limitation of exposures in construction the IWS and thus satisfy guidelines 3.1 – 3.4 of the RG [5]. Section 7.4 of the radiation protection plan describes arrangements for monitoring the environment, and states that during the construction phase of the IWS there are no identifiable radiation exposure pathways to wildlife in their natural habitats.

The assessor concludes that guideline 3.5 of the RG [5] is satisfied.

The assessor concludes that adequate information has been provided to satisfy guidelines 3.1 – 3.6 of the RG [5].

Radiation safety officer

The licence holder or applicant is responsible for ensuring that arrangements are implemented for a suitably qualified Radiation Safety Officer (RSO) to be appointed as appropriate to undertake specific duties to ensure that the licence holder or applicant's responsibilities for radiation protection and nuclear safety are met (RG 3.7 – 3.9 [5]).

Section 2.1.1 of the radiation protection plan provides information regarding the Health Physicist, which the assessor has confirmed with ANSTO to be equivalent to the RSO. The Health Physicist is a trained radiation protection professional who can advise on radiation protection matters, standards and optimisation measures.

The assessor concludes that adequate information has been provided to satisfy guidelines 3.7 to 3.9 of the RG [5].

Radiation safety committee

The licence holder or applicant is responsible for ensuring that arrangements are implemented for a suitably qualified Radiation Safety Committee (RSC) to be appointed as appropriate to undertake specific duties to ensure that the licence holder or applicant's responsibilities for radiation protection and nuclear safety are met (RG 3.10 – 3.21 [5]).

The radiation protection plan does not discuss a Radiation Safety Committee, but the effective control plan and safety management plan describe the Safety Assurance Committee (SAC) which reviews and approves the plans and arrangements for the construction of the IWS facility.

The assessor has confirmed that the SAC performs the functions of the Radiation Safety Committee and considers that guidelines 3.10 – 3.21 of the RG [5] are satisfied by the information that is

collectively described in the effective control plan, and safety management plan regarding the responsibilities and functions of the SAC.

Planning and design of workplace

The licence holder or applicant is responsible for ensuring that arrangements are in place and are implemented to ensure that the planning and design of any workplace where conducts and dealings are undertaken is optimised for radiation protection and that the design is in compliance with relevant national and international standards and codes (RG 3.22 - 3.24 [5]).

Sections 3.1 – 3.8 of the Preliminary Safety Analysis Report (PSAR) (IWS-C-LA-Cd) [12] describe how the design of the IWS will be compliant with current Australian Standards. These standards will cover radiological, chemical, industrial and fire safety and reflect international standards and codes.

The assessor considers that the application provides adequate information to satisfy guidelines 3.22 – 3.24 of the RG [5].

Classification of work areas

The licence holder or applicant is responsible for ensuring that arrangements are in place for the classification of work areas associated with conducts and dealings involving ionising radiation in accordance with ARPANS legislation, national and international standards and codes (RG 3.25 – 3.37 [5]).

Radiological classification and reclassification of work areas is described in sections 5.1 and 5.2 of the radiation protection plan. The classification of areas will be done in compliance with ANSTO WHS Radiation Safety Standard AS2310. The provision of PPE and monitoring equipment appropriate to the classification of the work areas is described in sections 6.1 and 7 of the radiation protection plan.

The assessor considers that adequate information is provided in the radiation protection plan to satisfy guidelines 3.25 – 3.37 of the RG [5].

Local rules and procedures

The licence holder or applicant is responsible for ensuring that local rules and procedures are in place and are implemented to provide an adequate level of protection, safety and supervision for controlled persons and visitors (RG 3.38 – 3.48 [5]).

During the construction phase there is no radioactivity present, and hence the radiation protection plan does not provide local rules or procedures due to the absence of supervised and controlled areas.

However the assessor considers that there is adequate information provided in the radiation protection plan to protect controlled persons and visitors during the construction phase. Development of detailed local rules will be required for the operating licence application when supervised and controlled areas will need to be well defined. It is the assessor's judgement that the applicant has extensive experience in developing local rules and procedures for such situations, and is capable of doing so adequately for the operational phase. The assessor considers that the

applicant is able to satisfy guidelines 3.38 – 3.48 of the RG [5] for constructing the facility and future conducts.

Personal protective equipment

The licence holder or applicant is responsible for ensuring that plans and arrangements are implemented for the provision of adequate and appropriate personal protective equipment (RG 3.49 - 3.53 [5]).

The use of PPE for working in radiological classified areas is described in section 6 of the radiation protection plan (IWS-C-LA-D3) [3]. No PPE for working in radiological classified areas is required for the construction phase of the IWS.

The assessor considers that guidelines 3.49 – 3.53 of the RG [5] are adequately satisfied in the radiation protection plan for the purposes of the construction licence application. Also the assessor considers that the applicant is able to satisy the guidelines 3.49 – 3.53 for the operational phase when radiological materials are present.

Monitoring of the workplace

The licence holder or applicant is responsible for ensuring that plans and arrangements are in place and are implemented for regular radiation and contamination monitoring of the workplace (RG 3.54 – 3.61 [5]).

Monitoring of the workplace is described in section 7.1 of the radiation protection plan. Radiation monitoring will not be required for the construction phase of the IWS.

The assessor considers that adequate information is provided in the radiation protection plan to satisfy guidelines 3.54 – 3.61 of the RG [5] for the construction phase. In addition the assessor considers that the applicant can satisfy the guidelines 3.54 – 3.61 for the operational phase when radiological materials are present.

Monitoring of individuals

The licence holder or applicant is responsible for ensuring that plans and arrangements are in place and are implemented for individual monitoring and assessment of exposure to controlled persons and visitors (RG 3.62 – 3.72 [5]).

Section 7.2 of the radiation protection plan describes arrangements for monitoring of individuals. Routine monitoring of occupationally exposed ANSTO employees is undertaken via the ANSTO personal dosimetry service using TLDs. Electronic personal dosimeters will also be worn by workers entering radiological controlled areas. Workers exiting contamination controlled areas are required to self-monitor for contamination. According to section 5 of the safety management plan, visitors must be escorted by an authorised ANSTO worker who must wear the appropriate dosimeter.

Although no information is supplied regarding assessment of non-ionising radiation exposure or assessment of internal ionising radiation exposure, the assessor does not consider these to be relevant as no sources of non-ionising radiation or contamination will be present in the construction phase of the IWS.

The assessor considers that the application contains adequate information to describe the individual radiation monitoring arrangements to help ensure people are protected against radiation hazards and is able to satisfy guidelines 3.62 – 3.72 of the RG [5] for the construction phase. In addition the assessor considers that the applicant can also satisfy guidelines 3.62 – 3.72 for the operational phase when radiological materials are present.

Monitoring of the environment

The licence holder or applicant is responsible for ensuring that plans and arrangements are in place for monitoring of the environment where appropriate (RG 3.73 – 3.78 [5]).

Section 7.4 of the radiation protection plan states that there are no identifiable routes of discharge of radioactive material into the environment during the IWS construction phase, nor exposure pathways to wildlife in their natural habitats. In addition section 9.9 of the Preliminary Safety Analysis Report (PSAR) (IWS-C-LA-Cd) [12] states that the IWS would have no environmental impact for ongoing operations with no potential exposure pathways to the natural environment.

The assessor considers that guidelines 3.73 – 3.78 of the RG [5] are adequately addressed in the radiation protection plan for the construction phase.

Protection of wildlife

The licence holder or applicant is responsible for ensuring that arrangements are in place to demonstrate the (ionising) radiation protection of wildlife (plants and animals) in their natural habitats is consistent with international best practice (RG 3.79 – 3.82 [5]).

Since no exposure pathways have been identified for the IWS construction phase, no specific arrangements are necessary to protect wildlife. Furthermore, as in *Monitoring of the Environment* above, no exposure pathways have been identified for the operational phase.

The assessor considers that guidelines 3.79 – 3.82 of the RG [5] are adequately addressed in the radiation protection plan for the construction phase of the IWS. In addition, the assessor considers the applicant is able to satisfy guidelines 3.79 – 3.82 for the operational phase when radiological materials are present, and hence no wildlife protection measures are necessary.

Transport

The licence holder or applicant is responsible for ensuring that arrangements are implemented for the safe transport of controlled apparatus and controlled material, both on and off site, in compliance with the ARPANS legislation and international standards and codes (RG 3.83 – 3.97 [5]).

Section 9 of the radiation protection plan contains information regarding transport and movement of radioactive materials. It is stated that transport of radioactive materials onsite and within the IWS will be carried out in accordance with the ANSTO guide AG 2515 Safe Movement and Transport of Radioactive Material. In addition, it is also stated that all materials leaving the site will be transported in accordance with ARPANSA Radiation Protection Series No 2: Code of practice for the Safe Transport of Radioactive Material [10]. Furthermore, section 5 of the Summary Safety Case

(IWS-SC-LA-SCS) [3] states that shipment and road transport of the ILW to the IWS at LHSTC will be the subject of a separate submission for approval by ARPANSA.

Since no radioactive materials will be transported onsite or offsite during the IWS construction phase the assessor considers that the application contains adequate information to describe the radiation protection arrangements during transport activities. In addition, the assessor considers the applicant is able to satisfy guidelines 3.83 – 3.97 for the operational phase of the facility.

Conclusion

The application contains a radiation protection plan (IWS-C-LA-D3) [3] and this and other documents contained within the application contain adequate information to describe the radiation protection practices during the construction of the IWS facility.

In view of the fact that there will be no radioactive materials involved in the construction phase of the IWS, the assessor concludes that the application contains adequate information to satisfy the radiation protection plan guidelines in the RG [5]. Furthermore the assessor considers that the applicant is able to provide an adequate radiation protection plan for the operational phase of the facility when radiological materials are present.

2.2.4 Radioactive waste management plan [Item 4(d)]

The licence holder or applicant is responsible for ensuring that all radioactive waste (including gaseous and liquid discharges) arising from conducts and dealings, existing and anticipated, is appropriately managed. The licence holder or applicant is also responsible for ensuring that appropriate plans and arrangements are in place for the safe handling, treatment, transport, storage and transfer or ultimate disposal of any such waste (RG 4 [5], RAPS 73 – 77 [4]).

Section 2 of the ANSTO radioactive waste management plan (IWS-C-LA-D4) [3] describes the ANSTO Radioactive Waste Management Policy and Safe Management of Radioactive Waste AG 2517, and the purpose of the IWS.

Section 3 describes limiting exposure to radioactive waste. It states that no radioactive waste will be generated during the construction phase. In addition there will be no gaseous discharges to the atmosphere, liquid discharges to the sewer or solid discharges to the municipal tip during the construction phase. Also there will be no incineration of wastes, and ANSTO Waste Operations currently does not employ incineration as a means of waste disposal. Furthermore sections 6.2 – 6.4 of the PSAR [3] state that no airborne discharges, liquid or solid wastes are expected to be generated during the operational phase of the IWS.

Guideline 4.39 of the ARPANSA RG [5] provides guidance on interim waste stores. The following list of requirements is considered to be relevant for construction of the IWS at LHSTC:

(a) The store is constructed of durable, fire resistant material.

(b) The store is conservatively designed to limit external dose rates to an acceptable level.

(c) There is enough space in the store for stacking, sorting and visual inspection of packages.

(d) The storage capacity is designed to accept at least the maximum operational holdings anticipated from the system.

(e) Provision is made for adequate environmental conditions in the store (heating, cooling, humidity control) to ensure proper conservation of waste packages.

(f) A documented maintenance program exists with records being kept of all maintenance.

(g) The waste storage is appropriate for the storage period prior to disposal of the waste.

(h) A multi-barrier approach is taken in ensuring containment.

(i) Waste forms and containers are resistant to degradation.

The assessor has identified the following information in the application which addresses the above requirements:

(a) The Facility Design document (IWS-C-LA-Ca) [3] describes the construction materials of the IWS building. The main building components of the IWS store are the concrete slab, precast concrete slabs and Kingspan metal backed panels which are durable and fire retardant (see www.kingspan.co.uk).

The assessor is satisfied that the building design is adequately durable and fire resistant.

(b) Section 9.6.2 of the PSAR [3] indicates that the surface dose rate on the TN81 flask is expected to be close to background, and a dose uptake assessment will be undertaken prior to an operating licence application. Similarly the contact dose rate from the technological waste is expected to be low, but cannot be confirmed at this point. Also section 9.6.1 of the PSAR [3] indicates that if dose rates measured on external walls of the IWS are too high from the technological waste, additional shielding may need to be provided.

The assessor considers that external dose rates from the store will be low, and can be lowered further if required by installation of additional shielding.

(c) Figure 1 of the Facility Design information (IWS-C-LA-Ca)[3] provides a plan layout of the IWS waste storage area. The total floor plan area is given as 840 m^2.

The assessor considers this area to be more than adequate for stacking, sorting and visual inspection of packages.

(d) Section 1.3.4 of the PSAR [3] discusses the potential for relocation of the UK waste to the IWS if the NRWMF is not available at the time of return of this waste material. It is stated that the IWS will be able to store this waste in its most bounding form in terms of spatial requirements ie 51 cemented waste packages (See Figure 2 of the PSAR [3]).

The assessor considers that the IWS storage capacity is designed to accept the maximum operational holdings anticipated in its lifetime.

(e) Section 4.4 of the PSAR [3] describes the ventilation systems of the IWS. It is stated that the ventilation systems are designed to maintain a particular ambient temperature within the

store (circulation only). The design takes into account the heat release from the ILW containers which is < 2 kW/m^3. The store is ventilated mechanically using fans which draws filtered air from outside and releases via the roof ventilator. The operation of the fans are controlled by occupancy sensors and temperature sensors installed inside the store. Failure of the ventilation system raises alarms locally and also at the Site Control Centre.

The assessor considers that adequate provisions are made for controlling the environment of the waste packages to ensure they are conserved properly.

(f) Section 4.11 of the PSAR [3] refers to maintenance operations. It is stated that upon completion of construction a detailed maintenance plan will be prepared which will include routine inspection and maintenance tasks needed for the waste packages. Maintenance tasks will also include maintenance of building services such as the electrical system, building crane, and the ventilation system. In addition section 2.3 of the ANSTO document Construction Licence Requirements for an Operating Licence (IWS-C-LA-Cb) [3] provides more details on maintenance requirements such as routine inspections of the TN81 flask including leak-tightness tests of the secondary lid seal, crane maintenance procedure, health physics checks.

The assessor considers that adequate information regarding maintenance requirements has been provided for the construction phase of the project. However it is expected that a fully detailed maintenance plan will be provided with any application for an operating licence for the proposed facility.

(g) The period of waste storage at the IWS is prior to its transfer the NRWMF. It is expected that the NRWMF should be available by 2020. In the application it is stated that the package life of the TN81 is 40 years. The technological waste is compacted and cemented inside steel drums which, in turn, are placed inside concrete over packs. The over packs are tested and approved transport/storage containers. These wastes will be stored inside the IWS building (see Section 2.4 of siting of Regulatory Assessment Report for the siting licence application [14]).

The assessor concludes that the waste storage period at the IWS is appropriate for considerably longer periods than those expected before transfer to the NRWMF.

(h) Section 4.2.1 of the Summary Safety Case provided with the application (IWS-SC-LA-SCS) [3] states that the safety of the waste returning from France is assured by various layers of defence-in-depth viz. vitrified solid waste, high integrity welded stainless steel CSD(U) canisters, protective copper baskets, type B(U) robust forged steel TN81 Transport/Storage container, neutron and gamma shielding built into the TN81, access controlled building, and secure site. The technological waste is cemented in a specially formulated cement mix and contained in a fibre concrete container which has also undergone a strict regime of tests. The six cemented waste drums will be arranged in a housing rack which is then placed in an ISO IP2 container. These waste packages will be stored within the purpose built, access controlled IWS on a secure site.

The assessor considers that an adequate multi-layer barrier to containment has been demonstrated.

(i) Both the vitrified waste form and the fibre concrete mix of the technological waste have been developed by AREVA for preservation of containment capability over long periods of storage, and are capable of enduring high irradiations. In addition the formulation of the vitrified waste form and fibre concrete mix have been developed to provide stability over the range of thermal and chemical conditions expected in use.

The assessor concludes that adequate assurance has been provided that the waste package will not degrade during storage at the IWS. It is expected that a more detailed safety case will be provided for the durability of the packages with an operating licence application.

Conclusion

The assessor concludes that the application contains a radioactive waste management plan and this and other documents contained within the application contain adequate information to describe the radioactive waste management practices during the construction of the IWS facility. The assessor also concludes that the applicant can satisfy guidelines 4.1 – 4.73 of the RG [5] for the operational phase of the IWS.

2.2.5 Security plan [Item 4(e)]

The licence holder or applicant is responsible for ensuring arrangements are made and implemented for the security of controlled facilities, controlled apparatus and controlled material, to prevent unauthorised access, damage, theft, loss or unauthorised use. The arrangements should include administrative and physical controls and barriers to ensure that the control of these items is not relinquished or improperly transferred, taking account of any relevant requirements imposed by the ARPANS legislation and, where applicable, the Australian Safeguards and Non-proliferation Office (RG 6.1 – 6.9 [5]).

The security advisers from the Security and Community Safety Section (S&CS) of ARPANSA reviewed and assessed the security plan for the construction licence application (IWS-C-LA-D5) [3]. The initial assessment concluded that the plan did not meet ARPANSA's protective security requirements. ANSTO were advised to submit a revised security plan that addressed all expectations in the RG [5].

The revised siting and construction security plan provided by ANSTO demonstrates compliance with ARPANSA's nuclear security expectations and details the integration of ANSTO-wide security plans and arrangements. S&CS security advisers further considered the potential impact on existing facilities during the siting and construction phases. It was assessed that the protective security measures detailed within the revised security plan during these transitional phases demonstrate an adequate level of protection for personnel, information and physical assets surrounding the proposed site.

Conclusion

The assessor considers that the revised site security plan provides adequate information to satisfy the RG [5] during the IWS siting and construction phases. However a more comprehensive site security plan will need to be submitted and endorsed for the licence to operate to incorporate the

specific security requirements for radioactive materials in accordance with the ARPANSA Radiation Protection Series No 11 Code of Practice for the Security of Radioactive Sources [15].

2.2.6 Emergency plans [Item 4(f)]

The licence holder or applicant is responsible for providing detailed emergency plans for any conduct or dealing which could give rise to a need for emergency intervention. This plan should be based on the assessment of the consequences of reasonably foreseeable accidents, and should aim to minimise the consequences and ensure the protection of on-site personnel, the public and the environment (RG 7.1 – 7.21 [5], RAPS 54(d) [4]).

Section 2 of IWS-C-LA-D6 [3] describes the emergency plan for the construction phase of the IWS. It is stated that the construction supervisor is responsible for ensuring emergency arrangements are in place and that all personnel involved are appropriately trained.

The assessor concludes that adequate information has been provided to satisfy guidelines 7.1 -7.21 of the RG [5] for the construction phase of the IWS.

Emergency procedures

The licence holder or applicant is responsible for ensuring that comprehensive emergency procedures are prepared in accordance with the objectives of the emergency plan for any conduct or dealing which could give rise to the need for emergency prevention (RG 7.22 – 7.35 [5]).

Section 3 of the emergency plan describes the procedures in the event of an emergency. It is stated that the IWS will be covered by the LHSTC emergency arrangements, AG 2466 ANSTO – LHSTC Emergency Response Plan, July 2012 [3]. In the event of a site wide emergency the ANSTO Site Control Centre which is manned 24/7 by the Australian Federal Police will be the focal point for communications. The next level down of emergency response will be managed by the on-call Duty Safety Co-ordinator (DSC). This is described in the ANSTO Guide AG 2973 Duty Safety Co-ordinator.

During the construction phase of the IWS there are no major activities occurring, and therefore no significant hazards that could cause a risk to people outside the facility. There will be no major nuclear or radiation hazards in the vicinity of the facility and a health physics survey will be conducted to ensure this.

The assessor concludes that adequate information has been provided to satisfy guidelines 7.22 – 7.35 of the RG [5] for the construction phase of the IWS.

Emergency preparedness

The licence holder is responsible for ensuring that all relevant agencies are prepared for such emergencies and adequate facilities and equipment are available and maintained (RG 7.36-7.42 [5], RAPS 16, 54(d), 123 [4])

All staff with a role in emergency response are trained in emergency response procedures and are familiar with existing emergency arrangements and escalation processes. Emergency response drills will be conducted before construction and commissioning of the proposed facility commences. The higher level response arrangements involving all of ANSTO's emergency response resources are

exercised periodically and involve external emergency services. There is ongoing review of the emergency arrangements, including updating of the contact lists and safety alarm responses.

During construction of the IWS, there will be no major activities and therefore no significant hazards in the IWS location that could credibly cause a risk to people outside the facility.

During the operating licence phase, ANSTO will develop and implement detailed planning and preparedness for the IWS in accordance with ARPANSA Radiation Protection Series No. 7 [13].

The assessor concludes that adequate information has been provided to satisfy guidelines 7.36 – 7.42 for the construction phase. In addition the assessor is confident that the applicant is able to develop detailed emergency planning and preparedness procedures for the operating phase.

Conclusion

The assessor concludes that the application contains an emergency plan and this and other documents contained within the application contain sufficient information describing adequate emergency management practices for the construction of the IWS facility

2.3 Authorisation to construct a controlled facility

2.3.1 Design of the facility [item 8]

Item 8 of Part 1 of Schedule 3 of the Regulations [2] requires the applicant to provide the design of the controlled facility, including ways in which the design deals with the physical and environmental characteristics of the site.

The Facility Design Information document in the construction licence application (IWS-C-LA-Ca) [3] provides a summary of the key design features of the proposed IWS.

Facility design

The facility is designed for the safe storage of transport/storage packages of the returned radioactive waste, allowing a container transport truck and its trailer (54 metres long, 12 axles, 8 wheels per axle) to be driven through the facility. When it is inside the facility, the TN81 Transport/Storage container will be unloaded from its transport cradle and moved to its designated location by an overhead 140 tonne dangerous goods rated crane. The TN81 container will be stored vertically in this location in accordance with its design. The foundation of the IWS store is designed to withstand seismic activity in compliance with AS 1170.4 – 2007. The entire structure will be constructed in accordance with the Building Code of Australia.

A workshop has been held by ANSTO to peer review the concept design, and included an international expert on transport/storage containers.

Building

The building will have a footprint of approximately 28 metres by 30 metres, and will be approximately 17 metres high to allow the TN81 transport/storage container to be lifted and stored in a vertical position.

The perimeter walls will be made of precast concrete panels approximately 170 millimetres thick, 5 metres high fixed to a structural steel portal. The rest of the perimeter walls will be fixed on top of the precast concrete panels and will be constructed of 200 millimetre thick Kingspan metal backed panels with good thermal insulation. The roof of the facility will be constructed of 150 mm thick Kingspan.

The concrete slab will be rated to withstand a weight consisting of the loaded TN81 container in transport configuration (≈ 115 tonne), its transport cradle and ancillaries, a prime mover and specialised trailer. The truck-trailer-cradle-container load will be driven into the IWS facility before removal of the TN81 container for storage in the vertical position.

Access road

Three routes for the transport/storage container within the LHSTC site have been identified. Following an initial assessment by Toll Logistics and then a detailed assessment by a traffic engineering consultant, a preferred access route through the LHSTC site was determined.

A specialist consultant engineering firm will be engaged to carry out inspection, provide construction advice etc for upgrade requirements for the route.

Crane

The main building crane will be designed to safely lift the heaviest container using an overhead dangerous goods rated crane of 140 tonne. A conservative assumption for the heaviest load combination is 121 tonne. This provides 16% spare capacity which is considered adequate since the TN81 container is drop tested from 9 metres onto an unyielding surface without release of contents. The crane will be sourced, installed and commissioned as part of the IWS construction.

Area radiation monitors

Area radiation monitors will be installed in the IWS facility to monitor for any unforeseen elevated dose rates. The dose rate at the surface of the TN81 container is expected to be at ambient levels. Similar dose rates are expected on the surface of the ISO container and concrete over packs for the technological wastes. Elevated dose rates are not expected in the IWS storage area. The area radiation monitors are considered an additional safety backup system.

Services

The following services will be provided to the facility:

- Water supply for fire fighting ie fire hydrants and fire hose reels.
- Sewerage and active drainage system ie B line.
- Stormwater connections from roof guttering and downpipes and surface runoff from the immediate building surrounds.
- Electricity and power supply for lighting, the crane, area radiation monitors, emergency and exit lighting, fire detection systems, PA system etc.

- Telecommunications services, including computer data network.
- Security systems and alarms, including security access control.
- Mechanical services. The facility will be mechanically ventilated with a 100% outdoor air handling unit.
- Compressed air and helium for testing the seals of the TN81 container.

Conclusion

The assessor considers that the application provides adequate design information for the proposed IWS facility as required in Item 8 of Part 1 of Schedule 3 of the Regulations.

2.3.2 Fundamental difficulties which need to be overcome [item 9]

Item 9 of Part 1 of Schedule 3 of the Regulations [2] requires the applicant to identify any fundamental difficulties which need to be overcome before any future authorisation is given.

These requirements are provided in the application in the document *Requirements for an Operating Licence* (IWS-C-LA-Cb)[3]. The objective of this document is to identify any matters that need to be resolved during the construction phase before an operating licence can be issued.

A review was conducted by ANSTO to establish if there might be any areas where fundamental difficulties might exist, in particular in the following areas:

- Design and procurement.
- Installation.
- Verification, testing and cold commissioning.
- Safety systems.

Since the IWS will be built in compliance with the Building Code of Australia and all relevant Australian Standards, no problems are anticipated with the design and procurement of the store. Similarly no fundamental difficulties were identified with installation of services.

With regards to verification, testing and cold commissioning, ANSTO has undertaken to implement all procedures and instructions for operation of the facility, including:

- Procedures and manuals provided by AREVA/TNI for routine inspection of the TN81 container.
- Leak-tightness test procedure for the TN81 container secondary lid seal.
- Crane operating and maintenance procedure.
- Routine inspection of the store including health physics checks, safety and housekeeping inspections.

There are no Category 1 and 2 systems identified in the Safety Assessment of the IWS provided with the construction licence application (ANSTO/T/TN2102-03, March 2013) [3]. All safety related items are Safety Category 3 [3] as follows:

(a) TN81 container shielding.

(b) Technological waste shielding.

(c) Building overhead crane.

(d) Ventilation system alarm

(e) Radiation monitors.

(f) Fire detection system.

(g) Fire hose reels and portable extinguishers.

In summary there are no foreseen fundamental difficulties with the construction of the IWS building which need to be resolved before an operating licence is granted.

Conclusion

The assessor considers that the application has taken into account whether there any fundamental difficulties which require to be addressed before any future authorisation is granted, and agrees with the conclusion that no fundamental difficulties have been identified. The application provides the information requested under Item 9 of Part 1 of Schedule 3 of the Regulations [2].

2.3.3 Construction plan and schedule [Item 10]

Item 10 of Part 1 of Schedule 3 of the Regulations [2] requires the applicant to provide a construction plan and schedule.

The construction plan and schedule provided in the application (IWS-C-LA-Cc) [3] outline the construction activities associated with the proposed IWS, including timelines.

The scope of the construction plan includes:

- Demolition of Building 63.
- Building of the IWS facility.
- Installation of a Dangerous Goods Rated 140 tonne crane.
- Provision of access roads.

Some equipment will undergo preliminary cold commissioning after the construction phase, and will involve testing of some equipment with the introduction of radioactive sources into the facility.

In addition to the construction schedule, the construction plan also identifies resources required for the project, including the facility nominee, project manager, construction supervisor, Head of

Nuclear Services, Health Physics Surveyor, Radiation Protection Adviser, Electrical Services, WHS Adviser, principal contractor and subcontractors.

The plan also provides an outline of the task and activities from site preparation, demolition works for Building 63, civil works including excavation and piling, through to construction of the IWS building and fitting out of the building. Once this is completed, the area radiation monitors will be installed, and services will be cold commissioned including the fire protection alarm system, building ventilation system, testing of electrical circuits and the area radiation monitoring system.

Conclusion

The assessor considers that an adequate construction plan and schedule for construction of the IWS has been provided as required by Item 10 of Part 1 of Schedule 3 of the Regulations [2].

2.3.4 Preliminary Safety Analysis Report [Item 11]

Item 11 of Part 1 of Schedule 3 of the Regulations requires the applicant to provide a Preliminary Safety Analysis Report which demonstrates the adequacy of the design of the facility and identifies structures, components and systems that are safety related items.

The objective of the preliminary safety analysis report (PSAR) provided in the application (IWS-C-LA-Cd) [3] is to demonstrate that the construction of the IWS facility is safe and that the proposed safety management of the facility is appropriate and will comply with relevant safety legislation.

The PSAR comprises the following sections:

- Site description (PSAR Section 2).
- Design safety principles (PSAR Section 3).
- Facility description (PSAR Section 4).
- Safety management (PSAR Section 5).
- Waste Management (PSAR Section 6).
- Review of operating experience (PSAR Section 7).
- Review of plant condition (PSAR Section 8).
- Safety analysis (PSAR Section 9).
- Decommissioning (PSAR Section 10).

Site description

The IWS site description is considered under section 2.1.3 of this Regulatory Assessment Report, and in section 2.1.3 of the siting licence application Regulatory Assessment Report [14]. No further discussion is considered necessary.

Design safety principles

This section describes the specific codes and standards to which the IWS facility will be built. This includes the Building Code of Australia for the IWS building, and the Australian Standard AS 1418.1:2002 for the 140 tonne crane and other relevant Australian Standards for service systems such as fire suppression.

Facility description

The facility description provides details of the IWS waste storage area, the TN81 transport/storage container, the technological waste and the IP2 ISO container, the ventilation system, the area radiation monitoring system, and the building crane. In addition information is provided on other auxiliary systems such as the electrical supply system, the fire protection system and building drainage system.

Safety management

This section provides information on general safety management at ANSTO, and local specific arrangements relating to the IWS. The IWS safety management plan is considered in more detail in section 2.2 of this report. The safety management plan describes safety management practices including the safety approvals system; safety culture; administrative arrangements; safe premises building and equipment; competency; training and supervision arrangements; control of visitors, contractors and other persons; control of hazards; incident reporting; audits and reviews and record keeping.

According to the safety categorisation of safety related items in the IWS, there are no structures, systems and components (SSCs) within the IWS which have items with Safety Category 1 or 2, and therefore no operating limits and conditions (OLCs) are required. Items of Safety Category 3 were identified in the Safety Assessment (ANSTO/T/TN/2012-13)[3] - Appendix E.1 of the Safety Assessment defines the radiological thresholds for Safety Categories 1, 2, and 3 where a Safety Category 1 requires items whose failure could lead to a radiological exposure exceeding 100 mSv (for occupationally exposed individuals) or 5 mSv (for a member of the public), taking into account other protective measures, with some degradation. Appendix E.2 claims that the TN81 transport container shielding is Safety Category 3 and the technological waste drums are Safety Category 3. These categorisations are based on exposures due to the worst credible accident calculated in section 7.1 of the Safety Assessment. The assessor has reviewed these safety categorisations in Appendix E.2 and agrees with the conclusions.

There are no nuclear safeguards requirements applicable as the reprocessed waste which is stored in the TN81 transport/storage container contains unrecoverable nuclear material. Furthermore, no additional nuclear materials will be stored in the IWS.

Nuclear criticality control is not relevant to the IWS facility since the reprocessing in France and the UK removes the vast majority of the fissionable material. The maximum content of fissionable material in the CSD-U canister and the arrangement of these canisters in the TN81 container prevents criticality.

Although there is no specific nuclear material (safeguards related) to be used or stored in the IWS there are Category 1 Security Enhanced Sources (ie A/D ≥ 1000), and the security plan for the operating licence will need to demonstrate that it complies with the ARPANSA Code of Practice for Security of Radioactive Sources [15].

Review of operating experience

ANSTO has been discussing and sharing operational experience with European organisations using the TN81 container, mainly the Central Interim Storage Facility for radioactive waste in Switzerland (ZWILAG) and the La Hague reprocessing facility in France (AREVA).

However, since the IWS has not been built or operated, no commissioning, radiological or operational data has yet been acquired by ANSTO.

Review of plant condition

The IWS facility has not yet been built so there is no information on plant condition at this time.

Safety analysis

The safety analysis provided covers two main aspects, viz.

- Normal operation.
- Accident scenarios.

A hazard identification and risk assessment for the facility was undertaken using information from AREVA, TNI, INS and other TN81 transport/storage container users.

Appendix A of the PSAR provides a summary of the hazard identification and risk assessment, and predicts likelihood of postulated accident scenarios and their consequence. The radiological risks identified are predicted to be very low → low, whereas conventional injury risks are predicted to be low → medium.

For safety analysis during normal operation it is stated in section 9.6 of the PSAR that there will be no routine process operations or activities in the building. The store is an unmanned facility and access will only be undertaken when maintenance or inspection operations need to be carried out. Therefore it is concluded that routine exposure of Waste Operations staff will be minimal.

Section 9.6.1 of the PSAR discusses routine radiation exposure to staff from the concrete waste drums containing the technological waste. It is stated that the actual contact dose rate from these drums is not yet available, but it will be less than 2 mSv/hr in order to comply with the IAEA and ARPANSA Transport Regulations [9,10]. It has been suggested in the Safety Assessment that additional shielding may need to be provided for the concrete wastes to reduce dose rates outside the facility, particularly along the northern wall, but the likelihood of this is small. Prior to submitting an operating licence application, ANSTO will review the estimated dose uptake by Waste Operations staff and provide additional shielding if required in accordance with the ALARA principle.

Section 9.6.2 of the PSAR reviews the routine radiation exposure from the TN81 container containing the vitrified wastes. Due to the massive shielding of the container, contact dose rates from the container will be close to background levels. Combined with the fact that no regular ongoing activities or operations with the TN81 container will take place, except for the leak testing of the secondary lid seal, exposures to staff are predicted to be negligible. During testing of the secondary lid seal, the operators will be trained and follow a quality assured procedure with the assistance of health physics and the radiation protection adviser. Again, ANSTO will calculate the estimated exposures prior to applying for an operating licence and submit to ARPANSA for review.

Sections 9.7 and 9.8 of the PSAR review the safety analysis for internal and external abnormal events respectively ie accident scenarios. For internal events, the IWS Safety Assessment Report (ANSTO/T/TN/2012-03) [3] concludes that the scenarios considered are assessed to have 'minor' to 'moderate' radiological consequences, but in the risk assessment in Appendix A of the PSAR none of these scenarios are assessed as having 'medium' or 'high' risk.

Safety analysis for external events such as loss of off-site power supply, seismic events, high winds, flooding, lightning strike, aircraft crash, external fire including bushfire, transport accidents, industrial activities, military activities etc are considered in section 9.8 of the PSAR. It is concluded that these external accident scenarios present a very low → low risk of radiological consequence or are considered not to be credible.

Decommissioning

The IWS is a radioactive waste storage facility and there are no operations or activities which could generate significant amounts of radioactive waste during its operation. The radioactive wastes in the IWS facility will be stored for an interim period until a National Radioactive Waste Management Facility (NRWMF) becomes available, at which time the entire waste inventory will be transferred to the NRWMF.

However, a decommissioning plan will be submitted to ARPANSA prior to the transfer of the wastes to the NRWMF, although it is not expected to be a complex plan due to the fact that no radioactive wastes should arise during the decommissioning.

Conclusion

The assessor considers that the application provides an adequate preliminary safety analysis report that demonstrates the adequacy of the design of the facility and identifies structure, components and systems that are safety related items. This provides information required under Item 11 of Part 1 of Schedule 3 of the Regulations [2].

2.3.5 Arrangements for testing and commissioning safety related items [item 12]

Item 12 of Part 1 of Schedule 3 of the Regulations requires the applicant to provide arrangements for testing and commissioning safety related items.

An assessment of radiological safety significance of the systems, structures and components (SSCs) was undertaken in the Safety Assessment of the IWS (ANSTO/T/TN/2012-03, March 2013) [3]. A list of the relevant Safety Category 3 SSCs is given below:

- TN81 container shielding.
- Technological waste drums.
- Ventilation alarms.
- Area radiation monitors.
- Building crane.
- Fire detection system.
- Fire hose reels and portable fire extinguishers.

The document Testing and Commissioning of Safety Related Items (IWS-C-LA-Ce)[3] submitted in support of the licence application states that the safety items identified above require to be tested and commissioned before an operating licence can be granted by ARPANSA.

The information provided indicates that no items are important to safety (ie Category 1 and 2) and all safety-related items listed above are Category 3 items.

With regards to testing and commissioning the following information has been provided in the application:

- TN81 container: this is a certified Type B(U) package under the IAEA and ARPANSA Transport Regulations [9,10]. Tests for these types of container were conducted during the design phase of the container.
- Technological wastes in an ISO container as IP2 package: the ISO container is also tested and certified as a transport package under the IAEA and ARPANSA Transport Regulations [9,10].
- Building crane: the building crane will be a dangerous goods rated crane. The total capacity is 175 tonne which is 25% more than the design load.
- Other Safety Category 3 items: these will be tested under acceptance testing protocols provided by the suppliers. Some items will also initially be subject to factory acceptance tests.

Conclusion

The assessor considers that the application provides adequate information on the arrangements for testing and commissioning of safety related items. This provides the information required under item 12 of Part 1 of Schedule 3 of the Regulations [2].

2.4 Assessment against Waste Guide

The ARPANSA Regulatory Guide: Licensing of Radioactive Waste Storage and Disposal Facilities [6] (Waste Guide) is based on international best practice, including the IAEA Safety Standard Series No WS-G-6.1 *Storage of Radioactive Waste* (2006) [8].

Section 2.4 of the Waste Guide describes the requirements to construct a radioactive waste storage or disposal facility. Section 2.4 states that the application should comprise as a minimum, the information requested in items 1 - 4 and items 8 - 12 of Part 1 of Schedule 3 of the Regulations [2]. Items 1 – 3 are provided in sections 2.1.1 – 2.1.3, item 4 in sections 2.2.1 – 2.2.6, and items 8 – 12 in sections 2.3.1 – 2.3.5 above, respectively.

Waste form and inventory

The radioactive waste from reprocessing of the used HIFAR fuel will be immobilised in a vitreous form (borosilicate glass) within sealed stainless steel canisters and transported/stored in the TN81 container. The TN81 container will hold between 23-28 stainless steel canisters – see section 4.3 of the PSAR [12]. Table 1 below provides the average source term for the main radioelements which account for over 99% of the activity in a single canister:

TABLE 1

Main radioelements	Activity (TBq/canister)
Am-241	1.38
Sr-90/Y-90	236/236
Cs-137	43.5

The approximately seven cubic metres of technological ILW waste consists of contaminated protective clothing and mechanical components (such as pumps, piping and valves) produced from reprocessing of the HIFAR used fuel assemblies. The technological waste will be cemented within steel drums and placed in six concrete shielded transport/storage over packs. The mean activity supplied for the technological waste packages indicates that the total activity in the technological waste will be less than 1% of the inventory of the vitrified waste in the TN81 cask.

The assessor considers that the waste inventory information supplied is adequate for the construction licence application. For an operating licence application, full detailed inventories will require to be supplied for both the TN81 vitrified waste and the technological waste.

Waste anticipated in operational lifetime

ANSTO indicated, in Section C of the application [3], that the waste to be stored in the facility during its operational lifetime is a single TN81 storage/transport container returning from France, and approximately 7m^3 of technological waste cemented within steel drums and placed in concrete

shielded transport/storage over packs. In addition it is stated that the waste returning from the UK may be required to be stored at the IWS if the NRWMF is not available. Since the form of the waste returning from the UK is not yet finalised, for the purposes of the design of the IWS it is assumed to be in the most demanding form, that is, 51 cemented drums, which is the most demanding form in terms of spatial storage requirements.

The assessor considers that adequate information has been supplied with respect to the waste anticipated for the facility during its operational life-time. Since the characteristics of the waste to be repatriated from the UK are not finalised, the assessor recommends that if the NRWMF is not available in time for the UK waste return, ANSTO submits a request for approval to store the UK waste. This is a matter for consideration in the review of subsequent licence applications rather than the licence to construct the IWS.

Transport of waste

Following a request for further information on the transport system to and from the facility, ANSTO provided further information on 25 June 2013. The additional information indicated that there is likely to be only two transport actions to the facility, one for the French waste and possibly one for the UK waste. In any event, each of these transport actions would be subject to separate regulatory approval as indicated in Section 5 of the Summary Safety Case (IWS-SC-LA-SCS Rev 2, March 2013) [3] provided with the construction licence application, which was submitted at the same time as the siting licence application. It is also stated that once the NRWMF is established it is likely that there will only be one transport action from the IWS to the NRWMF, and that due to the low number of transport actions and the robust nature of the packages[2], the risk is considered to be low.

The assessor concludes that the application contains adequate information at this construction stage regarding transport systems to and from the IWS facility.

Operational lifespan and contingency plan

It is not explicitly stated in the application what the expected operational lifespan of the IWS will be, but instead it is stated that the IWS will house the waste returning from France, and possibly the UK until the NRWMF becomes available which is estimated to be 2020. Following a request for further information from ANSTO on 12 June 2013 on its final disposal and contingency plan, ANSTO provided the response that final disposal of waste will be in line with Australian Government national policy. Currently it is anticipated that the ILW will be transferred to the NRWMF for storage pending identification and implementation of the final disposal option for Australia. ANSTO states that the current anticipated time for establishment of the NRWMF is 2020. In the event this is delayed, the contingency is the 40 year life of the transport/storage package, which covers safe storage until 2055.

[2] See section 2.6.1

The assessor expects the NRWMF will be commissioned before this date and is satisfied that ANSTO has provided an adequate contingency plan in the event that the NRWMF is delayed.

Decommissioning

Decommissioning of the IWS is described in Section 10 of the PSAR (IWS-C-LA-Cd) [12] which was provided with the construction licence application that was submitted at the same time as the siting licence application. The decommissioning strategy is outlined, although it is clearly stated that operation of the IWS is unlikely to generate a significant amount of radioactive waste.

The assessor concludes there is adequate information provided in the application to describe decommissioning.

Resources

Section G of the licence application [3] states that ANSTO has adequate funding from the Australian Government to oversee the return of the ILW from France during interim storage and future relocation to the NRWMF.

The assessor considers that adequate information has been provided to ensure ARPANSA of availability of resources over the lifespan of the facility.

Period of institutional control

Although no reference is made in the application to the period of institutional control for the IWS, the assessor does not consider that this requirement is applicable, since the IWS site will remain under institutional control whilst the LHSTC site remains under institutional control as required by the licences for other existing facilities on the site.

Safety and the safety case

Section 3.4 of the Waste Guide [6] states that a safety case shall be submitted to ARPANSA as part of a licence application. Section 4 of the Waste Guide [6] states that a summary of the application and the supporting safety case should be provided, in plain non-technical language. In addition, Section 2.4 of ARPANSA Radiation Protection Series No 16 *Safety Guide for Predisposal Management of Radioactive Waste* (2008) [16] requires a safety assessment to be undertaken and a safety assessment report to be produced.

To meet this requirement a summary safety case was provided with the construction licence application, which was lodged at the same time as the siting licence application. This document, *Summary of the Safety Case For the Interim Waste Store at the LHSTC* (IWS-SC-LA-SSC Rev 2, March 2013)[3], is discussed below.

The main components of the safety case for siting and construction of the IWS are:

- The Preliminary Safety Analysis Report (IWS-C-LA-Cd, March 2013) [3].
- The Safety Assessment [3].
- The Safety Assessment Report of Site Characteristics and Site Related Design Bases [3]

- The plans and arrangements [3].
- Supporting drawings, documents, certificates, reports etc [3].

All the above documents have been supplied by ANSTO in the siting and construction licence applications and are assessed in this Regulatory Assessment Report, primarily Sections 2.2 and 2.3.

Section 4.2 of the Summary Safety case (IWS-SC-LA-SSC Rev 2) [3] in particular provides information from the Safety Assessment of the IWS. For the intermediate Level Waste derived from reprocessing the used HIFAR fuel returning from France, the defence-in-depth features include:

- Immobilised vitrified waste form.
- High-integrity welded stainless steel CSD(U) canisters.
- Protective copper baskets.
- Type B(U) robust forged steel TN81 Transport/Storage Container.
- Neutron and gamma shielding built into the TN81 container.
- Access to controlled building.
- Secure site.

In addition, the TN81 is an internationally accepted robust container that is designed for wastes with significantly higher activities and heat loading than the Australian waste. The TN81 has undergone a strict regime of testing including drop test, impact tests and thermal/fire tests as required for a type B transport package. Similar cask types have undergone more severe impact test deemed equivalent to the impact of a jet fighter aircraft.

The technological waste is cemented in a specially formulated cement mix and contained in a fibre concrete container which has undergone a strict regime of tests similar to the TN81 cask. Six cemented waste drums will be arranged in a housing rack which is then fastened in an ISO IP2 transport container. Production and testing of the technological waste is carried out in accordance with the AREVA Quality Assurance programme.

Both the TN81 Transport/Storage container and the ISO IP2 transport container conform to the IAEA Transport Regulations requirements.

The assessor considers that the applicant has fulfilled the requirements of the relevant sections of the Waste Guide [6], in particular sections 3.4 and 4.

Dose constraints

Section 3.3.2 of the Waste Guide [6] describes the process of setting dose constraints and risk targets. It is stated that it is the expectation of the CEO of ARPANSA that the dose constraint for

occupationally exposed personnel would not exceed 5 mSv per annum for a waste store or disposal facility.

Initially the effective dose constraint for occupationally exposed personnel provided in the ANSTO application was 15 mSv per annum. Further information was requested by ARPANSA on 12 June 2013, and in response ANSTO stated that this was the general LHSTC site wide dose constraint. It was expected that the dose constraint for the facility would be much lower, not more than 5 mSv per annum and this would be finalised in the operating licence application. The assessor considers this is adequate for the construction licence application assessment where no radioactive materials are involved.

In addition section 3.3.2 of the Waste Guide [6] states that the public dose constraint should be of the order "of a few tens of µSv". The initial dose constraint proposed by ANSTO was 300 µSv per annum, but following a request for further information by ARPANSA, ANSTO stated that the estimated exposure to the hypothetical critical group was less than 5 µSv per annum, and that a lower dose constraint of 10 µSv per annum would be applied. The assessor considers that the dose constraints set out in the ANSTO responses to ARPANSA's questions of 12 June 2013 are adequate for the purposes of the IWS construction licence application assessment.

Following a request for further information on 12 June 2013, ANSTO indicated that radiological baseline monitoring will occur before construction of the store.

Conclusion

The assessor concludes that the application meets the requirements of the Waste Guide [6].

2.5 Other Matters for Consideration

Section 32 of the Act requires the CEO to take into account certain matters specified in the Regulations in deciding whether to issue a facility licence. These matters are prescribed in sub-regulation 41(3) of the Regulations. The matters are:

(a) whether the application includes the information asked for by the CEO; and
(b) whether the information establishes that the proposed conduct can be carried out without undue risk to the health and safety of people, and to the environment; and
(c) whether the applicant has shown that there is a net benefit from carrying out the conduct relating to the controlled facility; and
(d) whether the applicant has shown that the magnitude of individual doses, the number of people exposed, and the likelihood that exposure will happen, are as low as reasonably achievable, having regard to economic and social factors; and
(e) whether the applicant has shown a capacity for complying with these regulations and the licence conditions that would be imposed under section 35 of the Act; and
(f) whether the application has been signed by an office holder of the applicant, or a person authorised by an office holder of the applicant; and

(g) if the application is for a facility licence for a nuclear installation — the content of any submissions made by members of the public about the application.

Information asked for by the CEO

The applicant has provided all of the required information asked for by the CEO in the application, and therefore matter (a) is satisfied.

Undue risk

The applicant must demonstrate that the radiation risks arising from the proposed conduct have been considered, including the probability and magnitude of potential exposures arising from accident scenarios or abnormal occurrences.

During the IWS construction phase there are no major activities to be undertaken, and therefore there are no significant hazards in the IWS location. See section 4 of the construction emergency plan (IWS-C-LA-D6) [3]. In addition, there will be no nuclear or radiation hazards in the vicinity.

The assessor considers that the application has provided sufficient evidence to show that there is minimal radiological risk or consequence to both people and the environment from the construction of the IWS facility. The assessor concludes that matter (b) is satisfied.

Net benefit

The applicant must demonstrate that the proposed conduct produces sufficient benefit to individuals or to society to offset the radiation harm that it might cause, that is, the conduct must be justified, taking into account social, economic and other relevant factors.

The applicant describes the net benefit from the proposed conduct in Section G of the application. The net benefit is to meet Australia's international obligation to take receipt of the ILW generated from the reprocessing of HIFAR fuel assemblies. This benefit is linked to the operation of the HIFAR reactor for approximately 49 years to produce radioisotopes for medicine and industry. Since the public dose constraint for the IWS facility has been set at 10 µSv per annum as described section 2.4 in the siting licence application Regulatory Assessment Report [14], the radiation harm is negligible.

The assessor agrees with this assessment and concludes that matter (c) is satisfied.

ALARA

The applicant must show that the magnitude of individual doses, the number of people exposed, and the likelihood that exposure will happen, are as low as reasonably achievable, having regard to economic and social factors.

Section 3.2 of the radiation protection plan (IWS-C-LA-D3) [3] discusses optimisation of exposures and states that the ALARA principle will be formally applied by use of dose constraints, identification of hazards, and implementation of controls to optimise exposures.

The assessor accepts this argument for the construction phase of the IWS and concludes that the applicant has satisfied matter (d).

Capacity to comply

The applicant must demonstrate a capacity to comply with the regulations and any conditions likely to be imposed on the licence. This should include sufficient financial, material and human resources to manage the proposed conduct.

Section G of the application addresses the applicant's capacity to comply with the regulations and licence conditions. The applicant states that the IWS facility will be managed by the ANSTO Waste Operations section which has held ARPANSA licences for several years, and has demonstrated its capacity to comply. In addition, it is stated that ANSTO has adequate funding from the Australian Government to oversee the return of the ILW from overseas.

The assessor concludes that the applicant has addressed matter (e) adequately, and considers that the applicant has the capacity to comply with the regulations and any licence conditions.

Authorised signatory

The application must be signed by an office holder of the applicant or a person authorised by an office holder of the applicant, and in the latter case, an instrument of authorisation must be provided.

The application [3] was signed by Dr Adrian Paterson, CEO of ANSTO on 15 April 2013. The CEO of ANSTO is an authorised signatory, and thus matter (f) is satisfied.

Public submissions

In accordance with Regulation 40, Public submissions were invited by ARPANSA on the IWS siting and construction licence applications.

ARPANSA published notices in the following media, inviting submissions:

- Australian Government Gazette No 18, 8 May 2013.
- The Australian Newspaper, 8 May 2013.
- The ARPANSA website.
- The St George and Sutherland Shire Leader newspapers from 8-16 May 2013.
- The Liverpool Leader, 8 May 2013.

Submissions were also extracted from the transcript of the proceedings of the ANSTO licence applications Community Information Session held in Engadine Community Centre on 16 May 2013 [11].

In summary, ARPANSA received 30 submissions, 10 of which were relevant to the siting and construction of the IWS at LHSTC.

The submissions on the IWS raised the following issues:

- The timeliness of the establishment of the NRWMF.

- Demographic changes.
- Bushfire risks.
- Potential deferral of return of radioactive waste to Australia.
- Permanent storage of radioactive waste at LHSTC.
- Inventory of radioactive waste returning from France and the UK.

Submissions by the public have been assessed by ARPANSA. Issues raised, ANSTO's responses and comments by ARPANSA are presented in Appendix 1 of this report. These matters will be considered further in the licence application to operate the facility.

The assessor is satisfied that adequate consideration has been given to submissions by the public in relation to the application to construct the IWS.

2.6 International Best Practice

Section 32(3) of the Act requires the CEO, in making a decision on a facility licence, to take into account international best practice in relation to radiation protection and nuclear safety.

2.6.1 International use of the TN81 transport/storage casks for vitrified residues

The safety case of the TN81 cask is considered to underpin the safety case of the IWS, and hence international use of the TN81 cask was examined.

Following a request for additional information on the use of the TN81 cask, ANSTO provided information on the use of the TN81 cask at the ZWILAG facility in Switzerland where 3 casks have been loaded and stored at the ZWILAG site.

The information supplied describes the design evolution of the TN81 cask by AREVA to accommodate high burn-up spent fuel, capable of up to 56 kW. It should be noted that the decay heat of the ILW returning from France has a predicted decay heat of less than 11 kW, substantially less than the cask limit. The TN81 is the original version of the TN85 cask.

In 1998 an application was made in both France and Germany for the TN85 cask against the 1996 IAEA Transport Regulations. In order to demonstrate that the cask could meet the IAEA requirements in accident conditions, a 1/3 scale model was manufactured for drop test purposes.

A total of eight drops were performed on the test cask, with the majority of drops from 1 m onto a punch, and a 9m drop onto an unyielding target. The resulting values of leak tightness demonstrated were excellent relative to the requirements of the IAEA Transport Regulations.

Subsequent to these tests the French regulatory authorities granted approval of the cask design in March 2005, and the German authorities in March 2006. The granting of the German Certificate of Approval required additional factors to obtain the site storage licence, including:

- Analysis of accidental drop during handling.

- Analysis of consequences of a fire.
- Thermal requirements.
- Dose rate requirements (100 µSv/hr gamma and 250 µSv/hr neutron).

The assessor has examined reports and data on the usage of the TN81 cask for storage/transport of vitrified waste in France, Germany and Switzerland. The assessor concludes that the use of the TN81 cask for the safe storage and transport of vitrified waste has been successfully demonstrated internationally.

2.6.2 International Best Practice in radiation protection and nuclear safety

Section G of the application states that ANSTO will adopt all relevant safety requirements and guidelines, particularly the IAEA Safety Guide for Storage of Radioactive Waste (WS-G-6.1, 2006) [8] and IAEA Safety Requirements for Safe Transport of Radioactive Material (TS-R-1, 2009) [9].

In addition, the IWS will be designed to meet the relevant standards for buildings containing nuclear materials and high levels of activity and in line with the relevant ARPANSA Safety Guides.

The assessor considers that by meeting the requirements of the relevant IAEA Standards and ARPANSA Safety Guides the applicant has taken into account international best practice.

It is noted that interim storage is not considered international best practice. Nevertheless Australia has international obligations under the IAEA Joint Convention on the Safety of Spent Fuel Management and Safety of Radioactive Waste Management to take back its radioactive waste. Moreover ANSTO has contractual obligations with France and the UK to take the waste back within specified time frames. Hence interim storage is considered the best practical option. LHSTC is also considered the best location with existing and proven infrastructure and resources. It is also noted that section 5 of the ANSTO Act (1987) [17] states that ANSTO cannot host a permanent storage facility for radioactive waste.

3. CONCLUSIONS

The assessor considers that the application and information submitted in support of the application provide satisfactory evidence that:

1. The application was in a form approved by the CEO under Regulation 39(1), including payment of the relevant application fee (section 34 of the Act).
2. The applicant included all of the information asked for by the CEO under s34 of the Act (sub-regulation 39(2) and paragraph 41(3)(a) of the Regulations).
3. The information establishes that construction of the ANSTO IWS facility poses no undue risk to the health and safety of people or to the environment (paragraph 41(3)(b) of the Regulations).
4. The applicant has shown a net benefit from construction of the ANSTO IWS facility (paragraph 41(3)(c) of the Regulations).

5. The magnitude of individual doses, the number of people exposed and the likelihood that exposure will happen have been shown to be as low as reasonably achievable (paragraph 41(3)(d) of the Regulations).

6. The applicant has shown a capacity for complying with the regulations and licence conditions (paragraph 41(3)(e) of the Regulations).

7. International best practice in radiation protection and nuclear safety has been taken into account (sub-section 32(3) of the Act).

8. The application was signed by the requisite office holder (paragraph 41(3)(f) of the Regulations).

4. RECOMMENDATIONS

4.1 Issue of licence

It is recommended that a Facility Licence be issued to the Australian Nuclear Science and Technology Organisation (ANSTO) in respect of licence application A0279 authorising the construction of a nuclear installation, namely the Interim Waste Store situated at Lucas Heights Science and Technology Centre.

As indicated in Section 2.4 of this report, if the NRWMF is not available in time for return of the UK waste, ANSTO will need to submit a request for approval to amend the licence to store the UK waste.

Assessor NAME: Jim Scott	SIGNATURE:	*ORIGINAL SIGNED*	DATE: 25 /11 / 2013
Branch Head NAME: Martin Dwyer	SIGNATURE:	*ORIGINAL SIGNED*	DATE: 25 / 11 / 2013

5. REFERENCES

[1] Australian Radiation Protection and Nuclear Safety Act 1998.

[2] Australian Radiation Protection and Nuclear Safety Regulations 1999.

[3] ANSTO IWS application on the ARPANSA website http://www.arpansa.gov.au/Regulation/Branch/iws.cfm

[4] ARPANSA, Regulatory Assessment Principles for Controlled Facilities, ARPANSA, Rev 1, RB-STD-42-00, October 2001.

[5] ARPANSA, Regulatory Guide: Plans and Arrangements for Managing Safety, ARPANSA, v4, OS-LA-SUP-240B, January 2013.

[6] ARPANSA, Regulatory Guide: Licensing of Radioactive Waste Storage and Disposal Facilities, v2, OS-LA-SUP-240L, March 2013.

[7] ARPANSA Radiation Protection Series No 20 Safety Guide for Classification of Radioactive Waste (2010).

[8] Storage of Radioactive Waste, IAEA Safety Standards Series No. WS-G-6.1, 2006.

[9] Regulations for the Safe Transport of Radioactive Material, IAEA Safety Standards Series No. TS-R-1, 2009.

[10] ARPANSA Radiation Protection Series No 2 Code of Practice for the Safe Transport of Radioactive Material (2008).

[11] Public consultation webpage on the ARPANSA website

http://www.arpansa.gov.au/Regulation/Branch/consultation.cfm

[12] Interim Waste Store – Preliminary Safety Analysis Report, March 2013 (Revision 2) IWS-C-LA-Cd.

[13] ARPANSA Radiation Protection Series No 7 Recommendations for Intervention in Emergency Situations Involving Radiation Exposure (2004).

[14] ARPANSA Regulatory Assessment Report – Assessment of Facility Licence Application A0277 from the Australian Nuclear Science and Technology Organisation (ANSTO) to prepare a site for the ANSTO Interim Waste Store (IWS) at Lucas Heights Science and Technology Centre, R13/05519, November 2013.

[15] ARPANSA Radiation Protection Series No 11 Code of Practice for the Security of Radioactive Sources (2007)

[16] ARPANSA Radiation Protection Series No 16 Safety Guide for Predisposal Management of Radioactive Waste (2008).

[17] Australian Nuclear Science and Technology Organisation Act (1987).

APPENDIX 1

Responses to questions and comments from public submissions re: IWS, ANM Mo99 and SyMo applications

Question/comment	ANSTO Response	ARPANSA Comment
1. Of primary concern is a mixture of highly radioactive fission products ('molywaste') generated from ^{99}Mo is stated by ANSTO to comprise the majority of radioactivity to be stored at Lucas Heights, surprisingly more than spent fuel rods and considerably more than the waste returning from France. Molywaste, particularly in its liquid form represents the most hazardous material at Lucas Heights, both for ANSTO workers and surrounding residents.	The licence applications do not make this statement. The OPAL reactor at Lucas Heights is designed for 20MW with 300 days operating time per year. This requires burning 6.3Kg of U-235 per year with the corresponding fission products. The ANM Mo-99 plant running at its design capacity will use only 0.35Kg of U-235 per year generating a correspondingly significantly smaller amount of fission products.	ARPANSA assessor considers that ANSTO comment is acceptable as it relies on the proposed purpose and corresponding design. ARPANSA will consider further details when assessing the licence application for construction and operation of the facility.
2. Why has ANSTO not evaluated non-fission alternatives to avoid generation of molywaste? Serious consideration should be given to alternatives that use accelerators to produce 99Mo or 99Tc-m by selective reaction without fission-product waste.	ANSTO has evaluated non-reactor alternatives for the production of Mo-99 and Tc-99m. Such evaluation has also been undertaken by international bodies, in particular the OECD Nuclear Energy Agency (NEA). The NEA report (http://www.oecd-nea.org/med-radio/reports/Med-Radio-99Mo-Prod-Tech.pdf) noted that no such alternative technologies are currently in use anywhere in the world, and expressed strong doubts as to whether they could ever substitute for reactor technologies. Given that, it would be grossly irresponsible for ANSTO to risk the health of Australians on unproven technology.	The application is for production of Mo-99 in commercial scale. Based on the available information on production of Mo-99 in the literature ARPANSA assessor notes that accelerator production of Tc-99m is not used for any commercial scale production facilities.

3. Little has been said about the alternate proliferation risk of plutonium created as a by-product of 99Mo production and potentially separable from molywaste by altering the chemical treatment of the waste stream.	In a typical production year, the ANM Mo99 facility operating at capacity will produce approximately 6.2 g of Pu-239, which is less than 1/1000 of the amount that would be of significance from a safeguards perspective. Furthermore, that Pu-239 will be mixed with other materials and will therefore be unusable for any purpose. Further, the facility will be under IAEA safeguards, including regular inspections, to ensure that any material of concern could not be diverted from the declared activities. We also note that sub-section 5(2) of the ANSTO Act provides: "The Organisation shall not undertake research or development into the design or production of nuclear weapons or other nuclear explosive devices".	ARPANSA will consider sampling requirements and possible OLCs in this regard.
4. Insufficient details have been given to assess whether the quantity of Pu239 in accumulating molywaste is likely to be a proliferation concern. The isotope ratio is likely to be weapons-compatible.	See response to question 3.	See 3 above
5. Just how much plutonium will be produced in the waste stream for the new facility? ANSTO is requested to publish an accurate calculation of the mass of 239Pu created for each batch of 99Mo and the mass to thus accumulate over the course of the planned 99Mo production program.	See response to question 3.	See 3 above
6. ANSTO is asked to provide a long term road map for	See response to question 2.	See 2 above

	the development of non-fission based methods for the production of 99Tc-m regardless of the outcome of the current application.		
7.	There is concern that the proposed radioisotope production facility might potentially facilitate nuclear weapons development at Lucas Heights.	See response to question 3.	See 3 above
8.	If the Synroc system is so safe then why have there been so many successful legal challenges to moving the waste from Lucas Heights to a permanent repository?	There have been no successful legal challenges to moving the waste from Lucas Heights to a permanent repository. There is currently an unresolved court case (in which ANSTO is not involved) regarding the nomination of Muckaty Station in the Northern Territory as a possible site for a National Radioactive Waste Management Facility (NRWMF), but that case is based around provisions of the Land Rights Act, not any hazard which might be posed by radioactive waste. In any event, the waste to be stored in the IWS is not in synroc form but the majority of the waste is vitrified and a small amount of waste is cemented (i.e. technological wastes). The waste from the IWS will be moved to a NRWMF when it becomes available.	ARPANSA is not aware of any legal challenge in transferring waste from Lucas Heights.
9.	Is Synroc being used anywhere else in the world? If it is successful in dealing with nuclear waste why did we need to transport our waste overseas if we had this technology at the time?	Synroc is being investigated by many governments around the world and it has been shown to be cost effective for certain wastes. The Synroc HIP technology has been chosen by the UK for Pu-wastes and in the USA for calcined waste in Idaho. The *Environment Protection and Biodiversity Conservation*	

	Act 1999 and the *Australian Radiation Protection and Nuclear Safety Act 1998* prohibit the development of nuclear fuel reprocessing facilities in Australia. It is therefore not possible to use Synroc in fuel re-processing.	
10. A cost/benefit appraisal of Synroc and its reliability are missing from the public information.	A cost/benefit appraisal was developed in preparing the business case for the ANM projects. This has been subject to detailed scrutiny through the Cabinet process and the subsequent application to the Public Works Committee (PWC).	
11. Are we still going to transport any waste overseas for reprocessing?	Spent fuel from the OPAL reactor will be returned either for reprocessing in Europe or for permanent storage in the US. There is no current intention to send any wastes arising from the ANM facility overseas for reprocessing.	Any such conduct will be subject to ARPANSA scrutiny.
12. What are the risks of transportation of radioactive waste?	The safety record of the transport of radioactive material is very strong. The international regulations ensure the protection of people and the environment in all credible accident scenarios.	The safety of transport packages is assessed against the requirements of the ARPANSA Code of Practice for the Safe Transport of Radioactive Material 2008 (RPS 2) which is based on the IAEA Regulations for the Safe Transport of Radioactive Material. The transport containers are heavily engineered and extremely robust. This, coupled with the immobilised nature of the waste make the risks associated with transport of radioactive waste extremely low.
13. ANSTO may be given the go ahead to produce more nuclear waste than may be necessary.	One of the fundamental principles of radioactive waste management is that of waste minimisation and ANSTO is	ARPANSA has in the decision requested ANSTO to further detail their waste management plan

	committed to this principle. A strong factor in the selection of the Synroc process is that it minimises the volume of waste for later handling and storage. There are also comprehensive features in the ANM Mo99 plant for safely handling and minimising gaseous and other wastes.	and contingencies.
14. There is no information on the cost of the expansion of the production facilities, the IWS or the decommissioning of HIFAR.	We are not sure how this is relevant to the safety and security of the facilities. This application is not relevant to the decommissioning of HIFAR.	
15. State Emergency Services are already suffering a lack of resources. Does ANSTO contribute to the need for increased services? Is this included in the costs?	ANSTO has long established liaison arrangements with the NSW Emergency Services. These include joint meetings and joint exercises. In terms of the requirements for support and cooperation with these services, the new ANM Mo99 and Synroc facilities are similar to the existing facilities on the ANSTO Lucas Heights site which include the OPAL reactor, the existing Mo99 production facility and waste facilities. There will be no need for changes to these arrangements.	
16. Security has not been adequately addressed.	ANSTO has a comprehensive security system, based on Australian and internationally required standards, to guard its nuclear materials, radioactive sources and facilities. All people and vehicles entering the site are subject to inspection by Australian Federal Police (AFP) Protective Service officers, who guard the site 24 hours a day. AFP and ANSTO officers also regularly patrol the entire site and the buffer zone. There are regular reviews by expert agencies, including the Australian Security Intelligence Organisation and the Australian Safeguards and Non-Proliferation Office, to ensure security continues to meet the stringent national	Assessment of arrangements for Security has been assessed as required by Item 4(a) of Part of Schedule 3 of the Regulations. The results of assessment are presented in Section 2.2.5 of this report.

	and international physical security protection standards. In addition, agency inspectors from the Australian Radiation Protection and Nuclear Safety Agency can require access to ANSTO's sites at any time to conduct security inspections. ANSTO's security risk assessments are supported by information provided by the Australian Security Intelligence Organisation and other government departments and agencies. The Australian Federal Police are on site to provide an armed, high level and professional service that deters, prevents and effectively manages security threats through a proactive, flexible, robust and intelligence driven approach. The Australian Federal Police have a 24 hour presence at ANSTO with support from NSW Police and the Australian Defence Force as appropriate. Whilst armed Australian Federal Police is a strong deterrent there are a range of other of other sophisticated security controls involving people, technology, operations and processes. For each transport of radioactive materials a security transport plan is developed in conjunction with law enforcement agencies who provide security support to such movements.	
17. There is no legal compensation commitment for public health, property or environmental damage resulting from a serious accident.	On the issue of legal liability, ANSTO's liability would flow in accordance with usual legal principles of negligence applicable in NSW. This means that if ANSTO is proven to have caused personal injury or death to persons or property damage or environmental damage due to a release of ionising radiation, whether directly or indirectly, or due to other negligence, then it will be legally liable to compensate such persons or owners of such property. ANSTO has	

	commercial insurance in place to cover this potential liability, as well as supplementary cover under a Deed of Indemnity from the Commonwealth of Australia. The commercial insurance policy covers liability arising out of ANSTO's responsibility for : (a) managing, storing and conditioning Ionising Radiation (as defined) emitting material and waste; (b) transporting nuclear waste and materials for disposal both within Australia and overseas; and (c) transporting radioactive materials including radioisotopes.	
18. Why is such an industry supported when the scientific research community is crying out for funds for non-invasive and safe treatments?	The beauty of nuclear medicine is that it is indeed non-invasive and safe – which is recognised by doctors and by organisations such as the Cancer Council. ANSTO supplies some 10,000 doses of radioisotopes per week for use in nuclear medicine procedures across Australia. One in two Australians in their lifetime will receive a nuclear medicine treatment from OPAL. ANSTO-produced radioisotopes are used for the diagnosis of heart disease and a range of cancers and skeletal injuries both in Australia and internationally.	
19. Why is ANSTO producing Mo-99 beyond Australia's needs that are for overseas distribution, as the wastes to be generated from the excess production will be stored at ANSTO Lucas Heights Facility?	The Global supply of nuclear medicine is currently under threat, with reactors responsible for around 70 per cent of the world's current Mo-99 production due to close between 2015 and 2020. Further with medical modernisation in developing countries, global demand for Mo-99 is increasing by up to 10 per cent a year.	This matter has been considered in the decision and ANSTO is requested to further develop their waste management plan including contingencies

The production of Mo-99 is dependent on highly specialised infrastructure e.g. a reactor and Mo-99 production facility. As a result, every country cannot be expected to produce its own supply. Australia has benefited from international cooperation in the past when we needed to rely on imports of Mo-99 and has also contributed to world supply during shortages.

Australia is well placed to help meet the increasing demand for Mo-99 and as a member of the community of nations and a significant player in the region has a responsibility to do so.

Australia is also in a unique position of being able to produce Mo-99 exclusively using low enriched uranium (LEU). Currently, most of the global Mo-99 supply is produced in reactors fuelled by highly enriched uranium (HEU) and using HEU targets. HEU can be used in nuclear weapons. Consequently, alternative manufacturing processes are highly desirable.

For example, the US has put measures in place to favour Mo-99 produced in reactors fuelled by proliferation proof LEU, such as that used in Australia's OPAL reactor. The development of ANSTO's new Mo-99 facility will therefore contribute to global nuclear security and non-proliferation, and was identified by the former Prime Minister at the 2012 Nuclear Security

Summit as a major contribution by Australia to global

	nuclear security. Importantly, the co-located Synroc waste treatment plant will use the Australian innovation, Synroc, to convert the necessary waste into a stable, synthetic rock suitable for transportation to the National Radioactive Waste Management Facility for long term storage once it is operational. The new Synroc plant will reduce the volume of nuclear byproducts by 90 to 95 per cent compared to existing waste treatment methods, resulting in a smaller volume of waste being temporarily stored at ANSTO's Lucas Heights campus. The costs of waste treatment will be included in the price charged for Mo-99, meaning that there will be no subsidy to overseas patients.	
20. Where and when is a 'National Radioactive Waste Management Facility' going to be constructed?	There is bipartisan support for a NRWMF and it will be the Government who decides its location. The site currently under study is Muckaty station in the Northern Territory, however other sites may be considered. It is expected that a facility will be available by the end of the decade.	The *National Radioactive Waste Management Act 2012* makes provision to site, construct and operate a NRWMF subject to environmental and radiation protection regulatory approvals. The Department of Resources, Energy and Tourism (RET) has responsibility for management of the Commonwealth's radioactive waste and as part of this responsibility is implementing the Government's policy to establish a permanent facility.
21. The analysis given at 2.2.1 of "Siting Safety Assessment. Site Characteristics and Site Related Design Bases" about population around LHSTC looks	As stated in the Siting Safety Assessment (section 2.2.1), there are no credible accident scenarios that could cause any conceivable risk to the surrounding population. It was	For the three ANSTO licence applications, the projected population out to 2046 has been considered by ARPANSA; in particular, in its

really superfluous. There is a reference to quite out-dated "OPAL Safety Analysis Report (INVAP/ANSTO 2004)" (which is not provided) whereas the analysis about population density and population distribution is required.	thus considered unnecessary to include such population data in this application. However, ANSTO has developed decade projections of population from the ABS 2006 Census data, and the NSW Department of Planning data for another licence application	analysis of the Reference Accident of ANM Mo99 Facility.
22. The general requirement of the IAEA is low density area around a waste storage site. A multimillion population urban area in Sydney metro area cannot be considered low density. Location near the Woronora River, a major water supply, adds to the hazards.	That is not correct. The siting process is a risk-based one. To cite text from IAEA, the siting of nuclear installations "…is concerned with the evaluation of those site related factors that have to be taken into account to ensure that the site–installation combination does not constitute an unacceptable risk to individuals, the population or the environment over the lifetime of the installation." IAEA Safety Requirements No. NS-R-3, Nov 2003. Given the robust nature of the transport / storage containers and the immobilised nature (vitrified and cemented) of the waste, the risks associated with storage at Lucas Heights are negligible. Although the Woronora River is a water supply source, Lucas Heights is well downstream of the Woronora Dam. In any case, this is not relevant as there are no liquid, gaseous, or soluble wastes to be stored in the facility and therefore no credible release scenario is considered.	For the three ANSTO licence applications the projected population out to 2046 has been considered by ARPANSA; in particular, in its analysis of the Reference Accident of ANM Mo99 Facility.
23. The risks of possible large bushfire are too high (every 8 – 12 years). The deserted location looks much better.	Extensive studies have been undertaken in relation to the bushfire risk to the OPAL reactor. This has led to a detailed analysis of the different pathways that would constitute a risk to the public or to the environment. It has been concluded that there is no credible risk of the release of radiation from the OPAL reactor. The IWS is well enveloped	

	within the risk assessment for the OPAL reactor. There is much less radioactive material associated with the IWS, and the TN81transport/storage container in which the vitrified waste will be housed is rated to withstand temperatures of 800°C for 30 minutes. Hence there is no credible radiation risk from the IWS as a result of bushfire.	
24. What is to become of the decommissioned reactor? Is it to be cut up and buried at Lucas Heights?	This is a separate issue, and its regulatory approval process will be dealt separately but when the permanently shut-down reactor HIFAR is decommissioned, it will be dismantled in a safe manner. The radioactive waste arising from the decommissioning operation will be appropriately conditioned, packaged and sent to the NRWMF.	Decommissioning of HIFAR reactor is subject to ARPANSA regulatory approval.
25. I was required to sign an indemnity for the Australia Government before I could buy my house and when I raised that issue at the information session my veracity was challenged. So what is it that ANSTO is trying so hard to conceal? Whatever happened to transparency?	ANSTO is not aware of the basis for this statement, and cannot comment without seeing the document referred to. The applications for this facility – like ANSTO's operations generally - are open and transparent.	
26. ANSTO and the Government should negotiate deferral of planned return shipment until a suitable national repository is available.	Any attempt to renegotiate the time scale for return of the waste could damage Australia's international reputation in relation to our global nuclear obligations. It is important to meet our obligations to France otherwise it raises uncertainty and may have negative financial impacts on future reprocessing services.	
27. What assurances are there that Lucas Heights will not become a permanent waste store?	The ANSTO Act prevents that occurring.	The *ANSTO Act 1987* prohibits the permanent storage of radioactive waste at ANSTO.

28. I understand that the waste returning from France and the UK will carry the same amount of radioactivity as the original material sent from Australia.	This fact has been public since the 1990s.	This is correct, however there is a substitution contract for the waste from the UK, which means that the cement waste will remain there and an equivalent amount of more stable and lesser volume of vitrified waste will be returned.
29. Is there any high level waste resulting from decommissioning of HIFAR?	There will be no high level waste resulting from the decommissioning actions of HIFAR. ANSTO does not generate High Level Waste.	
30. What is the impact on the increased local population?	The safety assessment of the IWS (ANSTO/T/TN/2021-03 Rev 2) concluded that there are no credible scenarios which could impact on people or the environment.	The projected population until 2046 has been considered in ARPANSA analysis of the reference Accident of the ANM Mo99 Facility. ARPANSA analysis shows that there are no significant radiological risk to the people and environment.