



Australian Government

Australian Radiation Protection and Nuclear Safety Agency

Statement of Reasons

Decision by the CEO of ARPANSA on Facility Licence Application
A0292 from the Australian Nuclear Science and Technology
Organisation (ANSTO) to

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

8 May 2015

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1 The Licence Decision

On 8 May 2015, I decided to issue a licence under section 32 of the *Australian Radiation Protection and Nuclear Safety Act 1998* (the Act), to the Australian Nuclear Science and Technology Organisation (ANSTO), to *operate* a controlled facility at the ANSTO Lucas Heights Science and Technology Centre (LHSTC), namely, the ANSTO Interim Waste Store (*IWS Facility*). The licence application, signed by the Chief Executive Officer (CEO) of ANSTO, Dr Adrian Paterson, is dated 5 November 2014. Under regulation 7 of the Australian Radiation Protection and Nuclear Safety Regulations 1999 (the Regulations), the proposed facility is a *nuclear installation*. The licence authorises ANSTO to operate the *IWS Facility* for the sole purpose of temporary storage of radioactive waste from reprocessing in France of spent nuclear fuel from the operations of the High Flux Australian Reactor (HIFAR¹). Under section 35 of the Act I have included five (5) licence conditions including requirements to meet the facility Operational Limits and Conditions (OLCs) which must be approved by myself, and submit plans for the removal of waste stored in the facility by 30 June 2020.

The licence remains in force until it is cancelled or suspended under section 38 of the Act or until such time as it is surrendered under section 39 of the Act.

The reasoning behind the decision and the licence conditions is outlined in this Statement of Reasons.

2 Reaching the Decision

2.1 Background

On 29 November 2013, I granted a licence *to prepare a site* for the *IWS Facility* (Facility Licence F0277) and a licence *to construct* the *IWS Facility* (Facility Licence F0279). The Regulatory Assessment Reports (RARs) as well as my Statement of Reasons for the decisions are available from ARPANSA's website, <http://www.arpansa.gov.au/Regulation/ReturnofWaste/iwsdecision.cfm>

This present Statement of Reasons builds on the earlier decisions. It therefore focuses on the elements that are relevant to the operation of the facility and, in addition, includes some elements of the reasoning behind the earlier decisions, for completeness and clarity.

2.2 The documentary evidence

The documentation submitted by ANSTO in support of the applications including supplementary documentation requested by ARPANSA regulatory officers is listed in the Regulatory Assessment Report (RAR) R15/05147².

¹ The High Flux Australian Reactor, or HIFAR, operated between 1958 and 2007. It is now permanently shut down and is covered by a possess and control licence issued by ARPANSA to ANSTO.

² Lead reviewer was Dr Samir Sarkar, Regulatory Services Branch. Mr Jack Dillich, Branch Head, Regulatory Services Branch, Mr Jim Scott and Ms Julie Murray, Regulatory Services Branch, were involved in the review of the application and development of the RAR. Aspects of the *IWS Facility* has been discussed by the Nuclear Safety Committee which advises the CEO of ARPANSA on nuclear safety matters, <http://www.arpansa.gov.au/AboutUs/Committees/nsc.cfm>

The primary evidence before me was the considerations underpinning the previous decisions referred to in section 2.1, the application, the supplementary documentation, and the following:

- a. the RAR referred to above;
- b. international guidance relevant to international best practice (IBP);
- c. regulatory guidance material, developed for applicants and for ARPANSA assessors, as referred to in the RAR and in this Statement of Reasons;
- d. the Radiation Protection Series suite of publications developed to support and promote national uniformity in radiation protection and nuclear safety across Australian jurisdictions; and
- e. the content of public submissions received during the public consultation period.

2.3 Matters the CEO must take into account when issuing a facility licence

The Act stipulates that the CEO, in issuing a facility licence, must take into account IBP in radiation protection and nuclear safety as it relates to the application, and any matter specified in the Regulations. In addition, the Regulations specify information that *may* be requested by the CEO.

2.3.1 International best practice

Sub-section 32(3) of the Act mandates consideration of IBP, without providing a definition of IBP. I, therefore, commenced my task by reviewing the fundamental question of what constitutes IBP, before taking into account relevant IBP as identified by me, in my decision to authorise ANSTO to *operate* the IWS *Facility*. I have further considered IBP as it relates to the specifics of operation in this Statement of Reasons. For more general information on IBP, see ARPANSA's website³.

2.3.2 The Regulations

Sub-regulation 41(3) of the Regulations stipulates matters the CEO must take into account in deciding whether to issue a facility licence. These are:

- a. whether the application includes the information asked for by the CEO;
- b. whether the information establishes that the proposed conduct can be carried out without undue risk to health and safety of people, and to the environment;
- c. whether the applicant has shown that there is a net benefit from carrying out the conduct relating to the controlled facility;
- d. whether the applicant has shown 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;
- 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;
- f. whether the application has been signed by an office holder of the applicant, or a person authorised by the office holder of the applicant; and

³<http://www.arpansa.gov.au/Regulation/ibp/index.cfm>

- 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.

I have taken the above matters into account in making my decision as outlined in this Statement of Reasons.

2.3.3 Matters arising from the decision to authorise ANSTO to *prepare a site for the IWS Facility and to construct the IWS Facility*

In my Statement of Reason for the decisions to authorise ANSTO to *prepare a site for*, and to *construct the IWS Facility*, I foreshadowed information I would require for my assessment of the application to *operate the IWS Facility*, viz:

- *Radionuclide Inventory*
- *Contingency planning*
- *Further development of the safety case*

I have taken these matters into account in my decision as set out in section 3.1.5.

2.3.4 Other matters

Schedule 3, Part 1 of the Regulations specifies information that may be requested by the CEO – and that, if submitted, will be considered by the CEO when making a decision. ARPANSA has issued guidance on specific matters to consider when submitting such information, as referred to in the RAR and in this Statement of Reasons.

I have considered matters referred to in Schedule 3, Part 1 of the Regulations in this Statement of Reasons.

Under section 35 of the Act, I may impose licence conditions. In this case, I have decided to impose five (5) licence conditions.

My decision is further informed by ARPANSA's ongoing licensing activities and compliance monitoring of activities at the ANSTO LHSTC. Further, Regulatory Services Branch has developed and implemented a regulatory delivery model that focuses on a rigorous approach to regulatory inspections to promote safe and secure operation of the licensed facilities. E.g., I recently reviewed the systems and practices at ANSTO as part of my decision to grant ANSTO a licence to *construct* the ANSTO Nuclear Medicine Mo-99 Facility (the *ANM Facility*)⁴. While not being part of the information provided in support of the application and on which my decision covered in this Statement of Reasons is based, any such matter that I am aware of may improve my understanding of matters of general importance to, and my confidence in, the safety of operations at ANSTO and at the LHSTC.

For the purpose of this Statement of Reasons, *health and safety* refers to all factors that contribute to *protection of people and the environment from harmful effects of ionising radiation*, which includes radiation protection and safety, nuclear safety, waste safety, transport safety, physical protection and security and emergency preparedness and response. Consideration of safety as it

⁴ http://www.arpansa.gov.au/News/MediaReleases/mr1_041013.cfm

relates to other matters, *e.g.* as covered in the work health and safety legislation, is outside of my mandate.

3 Reasons for my Decision

In this section, I summarise my considerations in relation to the evidence before me against the provisions set out in the Act and the Regulations. I deal with the issues specified in sub-regulation 41 (3) of the Regulations in sections 3.1 to 3.6. Consideration is given to IBP and to other matters detailed in Schedule 3, Part 1 of the Regulations, as and where relevant.

3.1 Does the information include information asked for by the CEO?

In this section I consider in more detail some aspects that relate to the information submitted in support of the application and that were also considered in the previous decisions; whether sufficient information has been submitted for the purpose of reaching a decision on authorisation to *operate* the *IWS Facility*; and, whether the matters arising from the previous licensing decisions have been appropriately addressed.

It is implicit in the Act and the Regulations that the licensing of a facility will go through a number of stages, each covered by a licence (see, specifically, Schedule 3, Part 1 of the Regulations).

The staged licensing process is aligned with frameworks typically used to manage major projects. A staged project development and licensing process, which involves sequential regulatory reviews, mitigates problems arising from potentially important issues overlooked at the onset of the project. I consider the staged approach to completion of major projects to be IBP.

The issue of a staged licensing process has been discussed by ARPANSA in the Regulatory Guide: *Licensing of Radioactive Waste Storage and Disposal Facilities v2*, released in 2013⁵. It was concluded that, notwithstanding the fact that breaking up the licensing process into stages can be considered IBP, it is still necessary for the applicant to provide, at the time of submission of a licence application for a particular stage in the life-cycle of a facility, enough information about the specific stage covered in the application *and* about subsequent stages, to allow the CEO to form a view of the feasibility of the overall concept and the safety implications for the lifetime of the facility. The question to be answered in relation to the application before me is thus:

“With respect to the operational aspect per se, does the application to operate the IWS Facility provide necessary and sufficient information as regards the safety over the operational life-time, including relevant contingencies?”

3.1.1 Purpose of the facility

The purpose of the *IWS Facility* is to store radioactive waste resulting from reprocessing of fuel that has been used in the now permanently shut down High Flux Australian Reactor (HIFAR). The application concerns spent fuel that was shipped to France (La Hague) and to the UK (Dounreay)

⁵ <http://www.arpansa.gov.au/Regulation/wasteguide.cfm>

under agreements with AREVA⁶ and UKAEA⁷ to reprocess the fuel and to return the radioactive waste resulting from the reprocessing (i.e. residual fission products after separation of fissile material from the fuel) and secondary waste resulting from the reprocessing operations; the secondary waste, referred to as 'technological waste', includes mechanical components such as piping, valves, pumps and protective clothing, such as gloves, that have been contaminated during the reprocessing.

The purpose is further to store the waste *temporarily*. The intention is to eventually transport the waste to the planned National Radioactive Waste Management Facility, NRWMF.

No other purpose has been stated by the applicant or is considered in ARPANSA's review of the licence application.

3.1.2 General characteristics of the returned waste

The material to be returned will be of equal character in terms of radionuclide composition (allowing for the decay of fission products and with the fissile material removed) and hazardous properties, compared to the radioactive material that left Australia as spent fuel; however it will not be absolutely identical on an atom for atom basis and may contain radionuclides that were not present originally in similar amounts. This is because it is not technically feasible to retrieve exactly the same radioactive substances at the back end of the process as went in at the front end. Such substitution is not uncommon in arrangements of this kind and does not deviate from IBP if the material is well defined and of comparable character (from the risk and waste management perspective in the short and the long term) to the original material.

The fission products to be returned from France are contained in an inert matrix following vitrification of the liquid waste generated during the reprocessing. The vitrified waste is contained in a modified transport/storage cask known as TN81. The technological waste to be returned from France comprises approximately 7 m³ of waste cemented within steel drums and placed in concrete shielded transport/storage overpacks.

In addition, the waste to be returned from the UK may be required to be stored temporarily at the *IWS Facility*. This will only happen if the NRWMF is not available when the waste is returned. The return of the waste from the UK is planned to take place around the year 2020. Though the form of the waste returning from the UK is not yet certain, it is expected that the cemented waste (25.5 m³, 51 drums) considered for the purpose of design of the *IWS Facility* will be substituted by vitrified waste of less than 1 m³.

The waste to be returned from France contains about five times more activity than the material to be returned from the UK. The dominating fraction (approaching 99.9%) of the activity of the waste returned from France will be contained in the TN81 cask. The total activity of beta emitters is in the order of 15 petabecquerel (PBq)⁸, dominated by strontium-90/yttrium-90 in secular equilibrium and caesium-137. The conservatively estimated residual decay heat of the material contained in the TN81 cask is estimated to be a maximum of 15.4 kW. The exact inventory for the technological waste

⁶ AREVA SA is a French public multinational industrial conglomerate.

⁷ United Kingdom Atomic Energy Authority

⁸ One petabecquerel (PBq) = 10¹⁵ Bq. An activity of 1 Bq corresponds to one atomic disintegration per second.

is not specifically stated but is bounded (i.e. the technological waste *plus* the waste in the TN81 cask) by the inventory stated for the TN81 cask. I note that the exact inventory will be available prior to the loading of waste into the transport containers in France.

The waste classification scheme adopted in Australia⁹ specifies different classes of radioactive waste mainly on the basis of the disposal option which provides the adequate level of safety. The waste to be returned from both France and the UK is classified as intermediate level waste (ILW). This classification means that the waste contains long lived radionuclides in quantities that need a greater degree of containment and isolation from the biosphere than provided by near surface disposal.

Though the vitrified waste contains low amounts of fissile material it does, potentially, not come under nuclear safeguards considering the chemical proliferation barrier provided by the waste matrix containing fission products. However, this issue is outside of ARPANSA's remit and is under the jurisdiction of the Australian Safeguards and Non-Proliferation Office, ASNO.

3.1.3 The site and construction

Details of siting and construction aspects were considered in my decision granting the licence to prepare a site for (F0277), and to construct (F0279), the IWS Facility.

3.1.4 Operation

The *IWS Facility* provides shelter and necessary amenities for handling of the waste, which essentially involves receiving the waste containers and unloading them, and ultimately loading them and shipping them to the planned NRWMF (contingent on a successful licencing process for the waste facility) whereas no processing is foreseen while the waste is being stored, only monitoring and inspection. It also delineates the area where the waste is stored for security purposes.

The RAR, R15/05147, reviews the information submitted by ANSTO as to the arrangements for operation including the steps and procedures that will be undertaken from the receipt and handling of the TN81 cask to the setting up for monitoring whilst in storage for the interim period. The arrangements also describe the surveillance and maintenance activities during the operation of the facility.

The TN81 cask is a certified Type B(U) package under the IAEA requirements for safe transport¹⁰ and the ARPANSA Transport Code¹¹. It is designed to be capable of holding spent nuclear fuel, i.e. material with considerably higher activity and heat generation than the ILW it is intended to hold in the case of waste returned from France. It is used in other facilities internationally for storage of radioactive material/waste, e.g. the Central Interim Storage Facility for radioactive waste in Switzerland (ZWILAG) and the La Hague reprocessing facility in France (AREVA). A separate certificate will have to be issued by ARPANSA for the intended use (transport and storage) of the TN81 cask, in accordance with the ARPANSA Transport Code.

⁹ Classification of Radioactive Waste. Radiation Protection Series No.20, ARPANSA, April 2010

<http://www.arpansa.gov.au/Publications/Codes/rps20.cfm>

¹⁰ Regulations for the Safe Transport of Radioactive Material - 2012 Edition. IAEA Specific Safety Requirements SSR-6

¹¹ [Code of Practice for the Safe Transport of Radioactive Material](#), Radiation Protection Series C-2, ARPANSA 2014. This Code implements the Safety Requirements laid out in IAEA SSR-6.

3.1.5 Information related to matters arising from the assessment of the applications for authorisation to prepare a site for and to construct the IWS Facility

My Statement of Reasons accompanying the licence to *prepare a site* and to *construct* the *IWS Facility* identified three issues with regard to radionuclide inventory; contingencies; and the safety case, which are dealt with below.

3.1.5.1 Radionuclide inventory

My request with regard to radionuclide inventory was phrased as follows:

"An updated radionuclide inventory needs to be submitted to ARPANSA ahead of, or as part of, an application for a licence to operate the IWS Facility. This inventory should specify the inventory of the TN81 cask as well as the inventory of the technological waste returned from France, together with an analysis of equity with the spent fuel (minus fissile material) that was shipped to France for reprocessing. The analysis should consider the inventory as such and any radiological risks associated with alterations to the inventory during the treatment of the material in France.

As indicated in the Regulatory Guide: Licensing of Radioactive Waste Storage and Disposal Facilities v2 (see footnote 11), the safety assessment which forms part of the safety case is based on the inventory, and this should be updated with any update of the inventory.

I consider it possible on the basis of the available information on the nature of the waste being returned from the UK that it can be stored at the IWS Facility. However, there are significant uncertainties with regard to both amount and form at the present. A radionuclide inventory as well as an analysis of equity needs to be submitted in order to inform a decision on whether a licence to operate the IWS Facility can be issued that accommodates storage of the waste returned from the UK at the IWS Facility."

The ARPANSA review of updated information from ANSTO acknowledges that ANSTO has considered a conservative estimate of the radionuclide inventory of the waste returning from France in the final safety analysis report (FSAR). This inventory was considered for the accident analysis. The analysis shows that the radiological consequences from the operation and potential abnormal events related to the *IWS Facility* are very low. ANSTO stated that the exact radionuclide would be available prior to loading into the transport cask, and ANSTO would provide that inventory to ARPANSA once available. While the current 'bounding radionuclide inventory' is sufficient for the purpose of considering a licence to *operate* the *IWS Facility*, **I request ANSTO to provide me the radionuclide inventory in a timely manner following the loading of waste in the transport cask.**

The form of the waste returning from the UK is, as previously stated, not yet known with certainty; however, it is expected that the cemented waste considered for the purpose of design of the *IWS Facility* will be substituted by vitrified waste. ANSTO provided ARPANSA with an updated inventory of the UK inventory - which was *not* considered in the FSAR for the operation of the *IWS Facility*. Storage of the waste returning from the UK in the *IWS Facility*, should this be necessary, would require separate approval, potentially following an application for a relevant change with significant

implications for safety under regulation 51. I consider it appropriate that ANSTO dimension the *IWS Facility* and plan for its operations so that it may accommodate the waste returned from the UK.

3.1.5.2 Contingency planning

With regard to contingency planning, I requested ANSTO to consider the following:

“On the basis of this Statement of Reasons, I conclude that contingency plans for management of the waste under temporary storage at the IWS Facility need to be developed ahead of, or as part of, an application to operate the IWS Facility. These should consider reprocessing waste returned from France. Should ANSTO also pursue the plans to store reprocessing waste returned from the UK, similar considerations apply. The contingency plans should also consider specified time frames. In relation to this I refer to the previously quoted Regulatory Guide: Licensing of Radioactive Waste Storage and Disposal Facilities v2 [Footnote 5].”

“Based on international best practice, a guiding principle of the CEO is that an applicant for a licence to prepare a site for, construct, operate or decommission a storage facility shall provide a strategy (such as a reasonably practicable disposal option) for safe management of the waste in storage when the period of safe storage concludes. Such a period will be predicated on the safety case which will indicate not just the time of safe storage for waste in its current form, but the probable costs and technological challenges in maintaining storage beyond that period.”

ANSTO submitted a contingency plan addressing the above matter. In that plan ANSTO considered the following elements:

- Lifetime and future use of the facility
- Long term storage of waste and final disposal
- Contingency plan

The following contingency options were identified by ANSTO:

- Retention of the returned residues at ANSTO until the availability of a final disposal option
- Retention of the returned residues at ANSTO until the availability of the NRWMF for storage

ANSTO’s application is predicated on a 40 year operating life for the *IWS Facility*. The actual storage period of the returned waste is anticipated to be much shorter, based on the programme for the *selection of a site* for, and *construction* of the NRWMF, subject to regulatory approval.

If the establishment of the NRWMF were to be delayed beyond the 40 year lifetime of the facility, ANSTO would undertake the necessary actions to support a life extension of the facility and container or the safe transfer to another approved dual usage container. This approach is in line with the international practice as implemented for the Swiss ZWILAG Facility, and in other countries that store vitrified and other wastes in similar waste containers.

ANSTO also stated that should a life extension of the IWS facility be required, ANSTO would undertake an assessment of the integrity of the structure. In the event an assessment suggests

closure of the facility, ANSTO would initiate the construction of a new store, which would require separate regulatory approval.

ANSTO has considered reloading the waste into a new TN81 cask; in such case the reloading operation will be undertaken in a purpose-built facility and would require separate regulatory approval.

ANSTO refers to the Government's planning for siting and construction of the NRWMF which will be a near surface disposal repository for low level waste (LLW), co-located with an above ground store for ILW. This plan will have the provision for ILW storage above ground for approximately 100 years. The Government will continue to explore final disposal options including geological disposal over this period taking into account international best practice of disposal of such waste.

3.1.5.3 The safety case

With regard to the safety case, I requested ANSTO to consider the following:

"I request ANSTO to further develop the safety case for the IWS Facility. The ARPANSA Regulatory Guide: Licensing of Radioactive Waste Storage and Disposal Facilities v2 [Footnote 5] states:

"Based on international best practice requirements, the CEO expects that the applicant shall demonstrate that any proposed radioactive waste storage or disposal facility will meet the required level of protection by carrying out and presenting a safety case that draws upon the organisational and technical arrangements put in place, the nature of the waste to be accepted, the characteristics of the site, the design of the facility, including any engineered safety barriers, and the arrangements for its construction and operation."

Further guidance can be obtained from the Regulatory Guide referred to above.

It is acknowledged that in the present case of the IWS Facility, the safety case is heavily based on the safety case for the TN81 transport/storage cask. Nevertheless, there are additional elements, particularly related to transport, maintenance, demographic issues and the timeline for safe storage, and further handling of the waste post the life-time of the IWS Facility, which should be developed in the safety case presented in an application to operate the IWS Facility."

In order to address this matter ANSTO submitted a separate document entitled 'Interim Waste Store Operating Licence Summary Safety Case' (IWS-O-LA-SC, Rev 4). ANSTO prepared the safety case using the following documents:

- ARPANSA Regulatory Guide: *Licensing of Radioactive Waste Storage and Disposal Facilities v2*
- IAEA Draft Safety Guide DS284: The Safety Case and Safety Assessment for Predisposal Management of Radioactive Waste

The application has addressed the safety issues associated with the transport of TN81 container and DV78 ISO container. I note that the transport of the waste packages will be subject to separate

regulatory approval. If the NRWMF eventuates, the next transport of the waste packages would be from LHSTC to the NRWMF, which will also be subject to future regulatory approval. However, the proposed infrastructure associated with the facility will be adequate to support the next stage of transport from LHSTC.

ANSTO submitted arrangements for operation where details of maintenance aspects have been described. The ARPANSA reviewers found that the maintenance aspects have been adequately addressed as described in section 2.3.5 of the RAR (R15/05147).

The ANSTO safety assessment of the *IWS Facility*, which is the basis of the safety case, has considered the detailed aspects of the site characteristics including the surrounding population and the projected population to 2021. Considering the design safety features and operational controls of the facility, the form of the waste and the safety features of storage packages, the ANSTO analysis shows that there is no radiological impact on the population around the ANSTO site from the operation of the facility.

ANSTO states that the facility is designed for 40 years and the TN 81 package has a design life of 40 years. It is expected that the waste will be transferred to the NRWMF when it becomes operational. ANSTO has prepared a contingency plan for the wastes if the construction of the national facility is delayed or cancelled by the Federal Government as described above in section 3.1.5.2.

The holder of an operating licence must ensure that activities comply with the plans and arrangements for managing safety. In general, this means that the licence holder is responsible for establishing and implementing procedures that ensure compliance with the Safety Analysis Report (SAR), as updated. This includes the Operational Limits and Conditions (OLC), which are part of the SAR. The SAR is a main component of the licensing basis of the facility. It is the responsibility of the licence holder to keep it up-to-date.

3.1.6 Considerations and conclusion

I consider it reasonable that ANSTO operate the *IWS Facility* to accommodate both the waste returned from France and - if there is no other option available - the waste to be returned at a later time from the UK, subject to further specific regulatory approval. I note that ANSTO will provide ARPANSA with the exact radionuclide inventory of the waste returned from France once it is available prior to loading into the transport cask. Therefore, I request ANSTO to provide ARPANSA with the exact radionuclide inventory in a timely manner following the loading of waste in the transport cask. I note the inventory and the most likely form of the waste returning from the UK was provided to ARPANSA but the FSAR and the operating arrangements for the *IWS Facility* did not consider this inventory. Therefore, the licence to operate the facility at this time covers only the waste returning from France.

In the event that storage at the *IWS Facility* of the reprocessing waste returning from the UK becomes the preferred option, i.e. if the planned NRWMF is still not available at the time the waste is returned and all other solutions are deemed unreasonable or not feasible, different regulatory options are available. These include submission of an application for a relevant change with significant implications for safety, i.e. an application under regulation 51, for the approval of the CEO of ARPANSA to accept waste returned from the UK at the *IWS Facility*.

There are remaining uncertainties as regards the establishment of the NRWFMF. ANSTO has referred to credible plans and dealt with contingencies in an acceptable manner for the purpose of this decision. However, as the licence is not time-limited (even though the intention is to store the waste *temporarily*), and in view of the present uncertainty as regards waste to be returned from the UK, I request that ANSTO by no later than 30 June 2020 provide the CEO of ARPANSA, in a form acceptable to the CEO of ARPANSA, with information relevant to operational experience; plans for future operations; transfer to the NRWFMF; and, as relevant, contingencies (see further section 4.2).

No use of the *IWS Facility* other than for storage of waste resulting from reprocessing of HIFAR fuel is covered under this licence. Any future modification or addition to the purpose, except for what has already been dealt with above, would need to be considered under the Regulations; potentially, such changes could have significant implications for safety and would, in accordance with regulation 51, require prior approval of the CEO of ARPANSA.

I am satisfied that the evidence before me, including the RAR and the supplementary material requested and received from ANSTO during the course of the review, provides sufficient information with regard to the operational aspects of the facility, to proceed with reaching a decision on authorisation to *operate* the *IWS Facility*.

With regard to whether the information provided in the applications includes information asked for by the CEO:

I conclude that the purpose of the *IWS Facility* has been satisfactorily stated; that sufficient evidence is before me regarding nature of the waste and operating arrangements; and, that the final management of the waste has been adequately considered; to enable me to proceed with reaching a decision on authorisation *to operate* a Controlled Facility.

3.2 Does the information establish that the proposed conduct can be carried out without undue risk to health and safety of people, and to the environment?

The issue here is whether the proponent has demonstrated that there are systems in place to control and limit the risks associated with the proposed conduct, to allow me to conclude that the proposed conduct can be carried out without undue safety risks.

I consider the systems for control and limitation of risks below; the health and environmental implications of the proposed conduct are considered in section 3.4.

3.2.1 Plans and arrangements for managing safety and other safety-related information

In accordance with schedule 3 part 1 of the Regulations, the CEO may request information on plans and arrangements for safety when reviewing an application for a facility licence. The plans and arrangements outline how the proponent intends to operate the facility whilst achieving satisfactory safety outcomes. ARPANSA has issued comprehensive guidelines in this area¹².

¹² Plans and arrangements for managing safety v4 January 2013; <http://www.arpansa.gov.au/Regulation/guides.cfm>

The way the safety measures are implemented, in accordance with the plans and arrangements for managing safety, is important as the inventory of radioactive substances in the waste is significant, in the order of 15 PBq (see section 3.1.2). It would several-fold increase the inventory of radioactive substances at the LHSTC. However, it should also be noted that the material was originally stored on site in the form of spent fuel (note, however, the discussion on equity in section 3.1.2). The waste to be returned is hazardous but immobilized in a matrix that will effectively exclude or limit any credible exposure scenarios. Nevertheless, proper *management* of safety is of vital importance in order to eliminate and/or mitigate the radiations risks associated with storage of the waste in the *IWS Facility*. The RAR considers the arrangements in relation to the guidelines referred to previously (footnote 12) and the relevant regulatory assessment principles laid out in the *Regulatory Assessment Principles for Controlled Facilities*¹³. The RAR assesses, *inter alia*, the safety management plan (RAR section 2.2.2), the radiation protection plan (RAR section 2.2.3), the radioactive waste management plan (RAR section 2.2.4), the security plan (RAR section 2.2.5) and the emergency plan (RAR section 2.2.6).

It should be noted that the plans and arrangements are to a substantial extent already applied across the LHSTC and are monitored by ARPANSA as part of the Agency's compliance monitoring of ANSTO.

The Operating Licence Security Plan details the ANSTO-wide security plans as they apply to the *IWS Facility*. The security arrangements have been assessed by ARPANSA's security advisers who consider that the plan demonstrates adequate level of protection for personnel, information and physical assets surrounding the proposed site and facility.

With regard to transport, the Radiation Protection Plan submitted by ANSTO contains information relevant to transport and movement of radioactive materials. Waste arriving at, or leaving, the *IWS Facility* will be transported in accordance with the previously mentioned Transport Code. I note that the waste returning from France will arrive as one consignment. Any material returned from the UK and destined for the *IWS Facility* is likely to be limited to one consignment as well. Transport from the *IWS Facility* to the planned NRWMF is according to ANSTO likely to be a single consignment, even if this shipment was to include the waste returned from the UK.

A FSAR has been submitted that addresses, *inter alia*, the safety issues associated with different phases of the facility, and review of operational experience. A safety case has been submitted, which includes the design information for the facility, including the operational limits and conditions within which the facility will operate. The ARPANSA reviewers consider that both the FSAR and the safety case meet the requirements of the licensing process.

3.2.2 Considerations and conclusion

The RAR concludes that the application before me have included information that establishes acceptable controls for the proposed conduct. This includes but is not limited to information on measures to limit and monitor exposures of the workforce, the public and the environment; information on security provisions; information on transport; and a FSAR and safety case. I agree with the conclusions reached by the ARPANSA reviewers. Based on evidence submitted in support of

¹³ Regulatory assessment principles for controlled facilities; <http://www.arpansa.gov.au/Regulation/guides.cfm>

the applications, I consider I can proceed with reaching a decision on ANSTO's application for an authorisation to *operate* the *IWS Facility*.

With regard to whether the information establishes that the proposed conduct can be carried out without undue risk to health and safety of people, and to the environment:

I conclude that enough evidence is before me regarding safety-related information relevant to the proposed *IWS Facility*, to enable me to proceed with reaching a decision on authorisation to *operate* a Controlled Facility.

3.3 Has the applicant shown that there is a net benefit from carrying out the conduct relating to the controlled facility?

The issue of net benefit relates to the principle of *justification* in the international framework for safety. The basic elements of the framework as such are laid out in the IAEA Safety Fundamentals¹⁴, in the 2007 Recommendations of the International Commission on Radiological Protection (ICRP)¹⁵ and in the international guidelines on nuclear security¹⁶. This framework can be considered IBP, cf. also ARPANSA's IBP information at <http://www.arpansa.gov.au/Regulation/ibp/index.cfm>.

3.3.1 Net benefit of the conduct

In relation to the *benefit* of the conduct, it has to be borne in mind what the purpose is; as reviewed in section 3.1.1, the sole purpose of the facility is to *temporarily store radioactive waste resulting from the reprocessing of HIFAR fuel*. There is no net benefit from this conduct *per se* as it relates to material that is waste and for which no further use is foreseen¹⁷. The ICRP has considered the issue of justification of waste management and reiterated its position in its most recent publication on waste management¹⁸ as follows:

"The Commission has previously stated (ICRP, 1997b¹⁹) that radioactive waste management and disposal operations are an integral part of the practice generating the waste. It is wrong to regard them as a free standing practice that needs its own justification. Therefore, justification of the practice should include the management options of the waste generated, e.g. geological disposal. The justification of a practice should be reviewed over the lifetime of that practice whenever new and important information becomes available: such information may arise for societal, technical and scientific reasons. If the management of waste was not considered in the justification of a practice that is no longer into operation, the Commission

¹⁴ IAEA Safety Standards: Fundamental Safety Principles. Safety Fundamentals SF-1. International Atomic Energy Agency, Vienna, 2006.

¹⁵ The 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103. Ann. ICRP 37 (2-4) 2007.

¹⁶ Objective and Essential Elements of a State's Nuclear Security Regime. IAEA Nuclear Security Series No. 20 <http://www-ns.iaea.org/security/nss-publications.asp?s=5&l=35>

¹⁷ The ARPANS Act does not define nuclear, or radioactive, waste. ARPANSA considers radioactive waste as "waste that contains, or is contaminated with, radionuclides at concentrations or activities greater than the clearance levels established by the regulatory authority" and as "material for which no further use is foreseen: see Regulatory Guide: Licensing of radioactive waste storage and disposal facilities v 2 (footnote 5)

¹⁸ Radiological protection in geological disposal of long-lived solid radioactive waste. ICRP Publication 122. Ann. ICRP 42(3).

¹⁹ Radiological protection policy for the disposal of radioactive waste. ICRP Publication 77. Ann. ICRP 27 (suppl.) 1997.

recommends to optimize the protection of humans and the environment independently of considering the justification of such practice."

Thus, waste management and disposal options have to be considered in relation to the benefit of the 'practice' generating the waste, over the entire life-cycle. The benefit was associated with the operation of the HIFAR over approximately five decades, providing medical and industrial radioisotopes, neutrons for neutron beam research and opportunities for education and training.

ANSTO has demonstrated, as reviewed in the RAR and referred to in section 3.2.1 of this Statement of Reasons that adequate plans and arrangements for managing safety are in place. As further elaborated on in section 3.4, the radiation risks associated with the operation and decommissioning of the *IWS Facility* are very small; the impact of the *IWS Facility* for *temporary storage* of waste on the radiation risks over the life cycle of the HIFAR Reactor is, therefore, in all likelihood minor and not likely to alter any assessment of the net benefit of the practice.

3.3.2 Position of the *IWS Facility* within the national system for management of radioactive waste

The Australian policy for management of the nation's radioactive waste was described in the most recent report under the terms of the Joint Convention²⁰, which was submitted in 2014²¹. It was stated that

".....Australia's radioactive waste management policy requires that all radioactive waste generated within Australia be stored or disposed of in Australia at suitably sited facilities after being categorised in accordance with the national classification scheme and consistent with agreed international practice."

This policy is well aligned with the principles of the Joint Convention:

"Radioactive waste should, as far as is compatible with the safety of the management of such material, be disposed of in the State in which it was generated."

I considered this aspect further in my statement of reasons for granting siting and construction licences.

Of note is that since the decision referred to above was taken, the Government through the Department of Industry and Science has re-started the process for nation-wide voluntary nominations of sites to host the NRWMF, under the terms of the *National Radioactive Waste Management Act 2012*²². There is also a renewed discussion of feasibility of waste management facilities in South Australia, which is co-ordinated by the South Australian Nuclear Fuel Cycle Royal Commission.

²⁰ Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, <http://www-ns.iaea.org/conventions/jc-documents.asp?s=6&l=40>

²¹ 5th National Report of the Commonwealth of Australia, submitted October 2014 and reviewed at the Review Meeting under the Terms of the Convention in 2012, <http://www.arpansa.gov.au/AboutUs/Collaboration/jointconv.cfm>

²² An Act to make provision in relation to the selection of a site for, and the establishment and operation of, a radioactive waste management facility, and for related purposes https://www.google.com.au/?gws_rd=ssl#q=National+Radioactive+Waste+Management+Act+2012

3.3.3 Considerations and conclusion

Based on the reasoning above I conclude as follows:

With regard to whether the applicant has shown that there is a net benefit from carrying out the conduct relating to the controlled facility:

I conclude that enough information is before me regarding the safety significance of the *IWS Facility* to conclude that, if properly managed and making use of the infrastructure available at LHSTC, the safety impact is minor and would not in any substantial way affect considerations of the net benefit from the past operation of HIFAR. The *IWS Facility* has, under the present circumstances, a justifiable role in the Australian framework for management of radioactive waste in anticipation of the NRWMF. I thus consider enough evidence is before me to enable me to proceed with reaching a decision on authorisation to *operate* a controlled facility.

3.4 Has the applicant 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?

The issue considered under this heading relates to the two principles of radiation protection that have to be considered once a conduct involving radiation has been deemed justified; the principle of *optimisation* and the principle of *dose limitation*. They rest on the international framework for safety referred to in section 3.3.

The *optimisation* principle in essence means that all reasonable effort (from cost and societal perspectives) should be made to reduce doses, the number of people exposed and the likelihood of exposure; exposures should be *as low as reasonably achievable*, or ALARA. In order to mitigate any negative consequences for individuals, doses must be maintained within dose limits. To further guide protection, a *dose constraint* can be derived that is lower than the dose limit by an appropriate margin; it would be considered unacceptable to *plan* a conduct so that the constraint is exceeded.

Optimisation applies to all exposed categories of people. Limits and – when defined – constraints, are different for workers and members of the public. For wildlife, ICRP has defined *derived consideration reference levels* that may guide efforts to optimise protection²³; these and elements of other international frameworks for protection of wildlife have been considered in ARPANSA's Regulatory Guide on waste facilities.

The principles of radiological protection are considered by ANSTO in the radiation protection plan. ANSTO's commitment to the constraints and objectives stated in the radiation protection plan relate to the impact of all activities within the LHSTC. They are in agreement with the international framework for radiation protection as laid out by the ICRP.

Optimisation is considered here as relevant to *workers*, and to the *public and the environment*, and to the *exposure from accidents*.

²³ Environmental Protection: the Concept and Use of Reference Animals and Plants. ICRP Publication 108. Annals of the ICRP Volume 38 Nos. 4-6, 2008

3.4.1 Workers

The Regulatory Guide on waste facilities (see footnote 5) states that a constraint for a storage facility would not be expected to exceed 5 mSv. ANSTO has indicated that this is entirely feasible and is well within the statutory dose limit of 20 mSv annually as an average over five consecutive years.

The *IWS Facility* is a passive facility and staff would not need to be present other than for inspection and limited maintenance work. The TN81 cask is shielded and a very small elevation of the ambient dose rate is expected in its vicinity. The cemented drums containing technological waste will be stored in an ISO container.

Exposure of workers engaged when the *IWS Facility* receives the waste, and subsequently during the operational phase of the facility, and finally when the waste is shipped to the future NRWMF, are expected to be below the annual public exposure limit of 1 mSv.

3.4.2 The public and the environment

In my correspondence²⁴ to the then Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (now the Department of the Environment), I stated with regard to exposure of the public and the environment from the operations at the *IWS Facility*:

"In considering the potential for off-site contamination of the environment and potential for radiological exposure to humans and to non-human biota, we are mindful of the treatment, shielding and packaging of the material. At this stage of our evaluation, and subject to outcomes from our further review, we consider the proposed arrangements – if appropriately implemented – are likely to provide adequate safety and protection of people and the environment."

The referral decision of DSEWPaC of 29 October 2012, informed by my letter referred to above, was that the proposed facility was not a controlled action if undertaken in the manner set out in the decision.

ARPANSA's further assessment has indicated that there is no credible scenario leading to exposure of the public or the environment under normal operation and postulated accident conditions.

3.4.3 Exposures from accidents

The possibility of an accident, whether during transport or during storage, and whether caused by a natural event with safety implications, or through negligence, deliberate side-stepping of safety procedures or by an act with malicious intent, cannot be dismissed. The probability for an event is low; considering the design of the transport cask, the cemented waste and the waste matrix that prevents any spread of the material, consequences associated with any such event are also likely to be limited.

²⁴ Letter dated 12 October 2012; ARPANSA ref D 12015154

3.4.4 Considerations and conclusion

Based on submitted information and ARPANSA's assessment, I consider that the exposures to workers would be very small; and that exposure to the public or to the environment under normal operations would be extremely low. Radiation risks associated with accidents are considered to be small.

With regard to 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:

I conclude that enough evidence is before me regarding on-site and off-site radiological consequences of the proposed *IWS Facility* under normal operations and postulated accident conditions, and that the information as such provides sufficient reassurance of adequate protection of people and the environment from the harmful effects of radiation; that accident probabilities are low and associated consequences limited; and that the evidence before me at this stage enables me to proceed with reaching a decision on authorisation to *operate* a controlled facility.

3.5 Has the applicant shown capacity for complying with these regulations and the licence conditions that would be imposed under section 35 of the Act; whether the application has been signed by an office holder of the applicant, or a person authorised by an office holder of the applicant?

The capability of ANSTO, being the only nuclear operator in Australia and under ARPANSA's surveillance with regard to its compliance with the Act and the Regulations and all licence conditions imposed by ARPANSA, is assessed in the RAR as satisfactory; ANSTO has the necessary resources, staffing, competence, experience, systems and infrastructure that are required to carry out the safe operation of the *IWS Facility*. I thus consider that ANSTO has the capacity for complying with the Regulations and with the licence conditions that I may impose under section 35 of the Act for the conduct specified in the licence application before me.

The application was signed by the CEO of ANSTO, Dr Adrian Paterson.

3.5.1 Considerations and conclusion

Whether the applicant has shown capacity for complying with these regulations and the licence conditions that would be imposed under section 35 of the Act; and whether the application has been signed by an office holder of the applicant, or a person authorised by an office holder of the applicant:

I conclude that enough evidence is before me with regard to the capability of ANSTO, represented by the CEO for the purpose of this application, of carrying out the conduct defined in the application in a manner that is compliant with the Regulations and with the licence conditions I may impose, to enable me to proceed with reaching a decision on authorisation to *operate* a controlled facility.

3.6 The content of submissions made by members of the public about the application

3.6.1 Process

Regulation 40 requires the CEO of ARPANSA to advertise receipt of a licence application for a nuclear installation and to invite submissions.

The public was advised of the application, and submissions were invited in the following ways:

- a. through a notice published in the Australian Government Gazette on 10 December 2014;
- b. by posting information on the ARPANSA website from 10 December 2014;
- c. through an advertisement in The Australian newspaper on 10 December 2014;

A copy of the licence application submitted by ANSTO was made available to the public, along with advice as to how and when submissions could be made.

In making a decision on the licence application, paragraph 41(3)(g) of the Regulations requires the CEO of ARPANSA to take into account any submissions received from the public about the application. Section 3.6.2 below summarises the questions/comments raised in written submissions and the responses from ARPANSA.

3.6.2 Responses to the submissions

The issues raised in the submissions are described below.

Submission 1: Lack of time for public submission

This submission states that the proposal for a National Radioactive Waste Repository in South Australia was the best option, and the duration for public submission was inadequate. The submission requested extension of the consultation period.

ARPANSA comment: ARPANSA granted extension as per request until 13 February 2015 but no further submission was received.

Submission 2: Recommendation to approve the operation of the IWS Facility

This submission recommends approving the licence application from ANSTO to *operate* the *IWS Facility*.

ARPANSA comment: ARPANSA has no comment on this submission.

Submission 3: Development and operation of a long term solution for ANSTO's and Australia's nuclear waste and expedited the establishment of a National Radioactive Waste Repository

ARPANSA comment: Establishment of a National Radioactive Waste Management Facility is contingent on Government policy and the eventual submission of a license application (in the first instance likely to be to prepare a site for the NRWMF) from the Department of Industry and Science. When and if received, the application will be thoroughly reviewed by ARPANSA.

3.6.3 Considerations and conclusion

With regard to the content of submissions made by members of the public about the application:

None of the issues raised are adverse to the operation of the proposed facility. I may thus proceed with reaching a decision on authorisation to *operate* a controlled facility.

4 Over-all Conclusions and Licence Conditions

4.1 Conclusions

The ARPANSA reviewers have assessed the *IWS Facility* in relation to *preparation of a site* for the facility; and the *construction* and – most recently – *operation* of the facility. I have used this and other information in my decisions, recorded in the Statement of Reasons for granting ANSTO licences to *prepare a site for*, and to *construct*, the *IWS Facility*; and in this Statement of Reasons underpinning the present decision to grant ANSTO a licence to *operate* the *IWS Facility*.

As discussed in my Statements, stepwise decision making allows for gradually improved understanding of the safety aspects of the facility and for dealing with conceptual or specific safety-related issues in an open and transparent manner. As recorded in my Statements, I find that the totality of information provides me with enough detail to proceed with a decision. The documentation also provides me with assurance of safety of the operations; I have therefore issued ANSTO with a licence to *operate* the *IWS Facility*, as recorded in the licence, for temporary storage of the waste generated during reprocessing in France of fuel irradiated in HIFAR. I have imposed five (5) licence conditions, as outlined below.

4.2 Licence conditions

I have specified five (5) licence conditions in Schedule 2 of the licence. Licence conditions 1 to 5 relate to:

- quarterly reporting
- periodic review of safety analysis
- periodic self-assessment
- operational limits and conditions
- plans for removal of waste

As a general rule, a regulator must be mindful not to issue a licence if there are doubts as to the safety of the operations, and refrain from compensating for such doubts through issuing licence conditions (i.e. the licence conditions become surrogates for operator-implemented safety).

However, an applicant must also be given reasonable opportunity to refine the complete description of the safety envelope of operation of a controlled facility. I am of the view that the incorporation of relevant operational limits, and the functional capability and performance level of equipment considered in the safety analysis is sufficient to define the safety envelope of the *IWS Facility*.

In light of the derivation of the OLCs from detailed safety analysis of the facility, the ARPANSA reviewers recommend the following licence condition which I concur with:

The licence holder must ensure that the facility complies with the Operational Limits and Conditions (OLCs) approved by the CEO

The licence is not limited in time; however, the purpose of the facility is *temporary* storage of the waste, pending solution for its final management. The length of storage is contingent on the establishment of the NRWMF, or any alternative final management solution that may be considered in the future. It is therefore reasonable to request, at appropriate times, updated information as regards the performance of the *IWS Facility*, and projections for the future. I have therefore included the following licence condition:

The licence holder must submit to the CEO, no later than 30 June 2020 and in a form acceptable to the CEO, plans for the removal of waste stored in the facility.

4.3 Other considerations

With reference to the discussion in section 3.1.5.1, I reiterate the request that ANSTO provides ARPANSA with the radionuclide inventory in a timely manner following the loading of waste in the transport cask (pertains to the waste returned from France).

Sydney, 8 May 2015

Carl-Magnus Larsson, CEO of ARPANSA