Appendix 4 of ARPANSA Regulatory Assessment Report for the ANSTO ILWCI Siting Licence Application

Documents requested for release by public submissions relating to Licence condition 5 of the ANSTO Intermediate Waste Store Licence and Licence Condition 14 of the ANSTO ANM Licence

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15 June 2020

Dr Carl-Magnus Larsson
Chief Executive Officer
ARPANSA
PO Box 655
Miranda 1490

Dear Dr Larsson

Re: Plan to remove waste holdings from the Interim Waste Store

ARPANSA Facility Licence F0292 to operate the Interim Waste Store (IWS) contains condition 5:

> '5. 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 the waste stored in the facility.'

It is the intention to meet this condition through the provision of this correspondence.

Current IWS Waste Inventory

Radioactive waste managed in the IWS is in two forms:

- Vitrified residues from spent fuel reprocessing held in stainless steel canisters (CSD-U) stored in a single 110 tonne dual purpose transport and storage cask (TN 81 package)
- Material contaminated during the reprocessing of the waste residues, which has been immobilised by grout inside 500L cement containers stored in one shipping container.

Both wasteforms contain long-lived nuclides of sufficient quantity that mean they could not be disposed of in a low-level radioactive waste disposal facility. Accordingly, they will need to be disposed of in an intermediate-level waste disposal facility.

Waste Movement Plan

The current plan for the proposed National Radioactive Waste Management Facility (NRWMF) is that the Facility will comprise a low-level waste disposal facility and an intermediate-level waste (ILW) storage facility. The NRWMF's ILW store will be used to centralise the management of ILW stored in Australia. The current published timeline for the Facility to become operational is 2026.

In October 2017, the then Minister for Resources and Northern Australia, the Hon. Barnaby Joyce MP, provided you with assurance in the form of a letter that the Commonwealth Government is committed to identifying and developing a permanent disposal pathway for ILW and that a process to establish such a pathway would commence once appropriate institutional arrangements had been established.

As you would be aware, the Australian Government currently is giving consideration to the nature of these arrangements and ANSTO is actively involved in these discussions. Concurrently, ANSTO also is working with Government to enable some early research to be conducted regarding the identification of potential disposal pathways.

Assuming that the ILW store is part of the NRWMF and that the TN 81 package will be stored there, it is expected that the package would be transported some years after the opening of the NRWMF. This

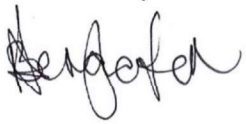
will allow for the larger volumes of low-level waste to be transferred to the NRWMF first. The shipping container of cemented waste may be sent independently and earlier given the simpler transport logistics.

Safety and Security

While the two wasteforms continue to be stored at ANSTO, they will be safely and effectively managed in the Interim Waste Store. The CSD-U canisters within the TN 81 package are kept in partial vacuum and inert atmosphere to minimise the potential for their corrosion. The package is monitored regularly to ensure integrity. Monitoring activities include visual inspection of the package to assess whether there is any damage, temperature checks of the cask to ensure that there is no increase in temperature over time, radiation emissions assessments to ensure that there is no increase in dose over time, and pressure testing to ensure that the environment within the cask reduces the corrosion rate of the CSD-U canisters.

If you or your team have any questions or would like to arrange a meeting to discuss this plan, please do not hesitate to contact [redacted]

Yours sincerely



Paula Berghofer
General Manager, Waste Management Services
Licence Nominee for the Interim Waste Store (F0292)

Australian Government

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7 July 2020

Dr Carl-Magnus Larsson
Chief Executive Officer
ARPANSA
PO Box 655
Miranda 1490

Dear Dr Larsson

Re: Plan to remove waste holdings from the Interim Waste Store

A submission was provided to ARPANSA on 15 June in relation to ARPANSA Facility Licence F0292 to operate the Interim Waste Store (IWS) with respect to condition 5:

> '5. 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 the waste stored in the facility.'

That submission provided information about ANSTO's plans in relation to the above licence condition.

I wish to add to that submission through the provision of this letter.

Please find below additional information regarding contingency arrangements for the management of the waste currently held in the IWS should the National Radioactive Waste Management Facility (NRWMF) be further delayed or not proceed.

Contingency arrangements - NRWMF short term delays (up to 2045)

TN 81 Package and Associated Technological Waste

The TN 81 package is designed to store radioactive materials for a minimum duration of 40 years, as described in TSAR-TN81-DOS-13-00089962-050. Radioactive material was first loaded into ANSTO's TN 81 in 2015, meaning that the package is designed to safely store the nuclear material it currently houses until 2055. ANSTO's continuous monitoring systems and periodic inspections will confirm that the flask remains fit for purpose while it is held at ANSTO. A safety analysis will also be performed every 10 years, in accordance with condition 2 of the Facility Licence.

The DV78 IP2 ISO container requires minimal monitoring and maintenance while it remains in undercover storage within the IWS, which is a secure, non-occupied storage facility that requires (and permits) minimal access by personnel.

Current Australian Government policy is for the NRWMF to be established by the end of the current decade. Were that Facility not to become available before 2045 the TN 81 package and associated technological waste in the DV78 IP2 ISO container would continue to be managed at ANSTO in the IWS.

IWS Facility

The IWS has a conservative design life of 40 years, formulated around the 40-year life of the TN 81 flask. The IWS and its structures and components will continue to be monitored and maintained. If any deterioration in the integrity of the facility were to be identified, appropriate rectification works would be performed.

Contingency arrangements- NRWMF longer term delays or discontinuation

TN 81 Package and Associated Technological Waste

After approximately 30-35 years of storing the current radioactive materials (i.e. in 2045-2050), ANSTO would investigate the integrity of the package. If the results of the assessment were to show that the package retained its integrity and was safe for continued storage for a period of years to be determined at that time, ANSTO would seek to extend the life of the package for a defined period of years.

If the assessment showed that the TN 81 package was unsuitable and unsafe for storage past the initial period of 40 years, ANSTO would seek to procure a new TN 81 container and determine the most appropriate and safe means to transfer the stainless steel containers containing the vitrified waste stored in the present TN 81 package to the new package. This could involve the construction of a fit-for-purpose suitably shielded hot cell facility on the Lucas Heights campus to facilitate the transfer.

If this option were to be pursued, ANSTO would work with Government, ARPANSA, and all relevant stakeholders to obtain support for this option, and to ensure the timely establishment of the hot cell facility, as well as the safe and effective transfer of the waste in line with regulatory requirements.

Another option could be for the current TN 81 package to be sent overseas to a company with the required facilities and skills for the waste to be repackaged and then repatriated to Australia for management. ANSTO would examine all aspects related to the transport of the package in conjunction with stakeholders and would seek to obtain Government and regulatory support for this option should it be deemed the most appropriate.

IWS Facility

In the event that the NRWMF is not established within 40 years, ANSTO would make a submission to ARPANSA to extend the design life of the IWS facility. Rigorous safety and environmental assessments would be undertaken to ensure that the structure and durability of the building remain compliant with all regulatory and safety requirements for the proposed extended storage period.

The life expectancy of the facility's concrete floor and structural steel is expected to be greater than 40 years, and any exposed surface materials (for example, roof sheeting) could be replaced, as has been done for some buildings covered by the current Waste Operations licence.

If the facility ever were deemed to require closure while the TN 81 package and associated technological waste remained at ANSTO, we would seek the support of Government to initiate the construction of a new store, subject to licensing requirements.

Final Disposal Pathway

The final disposal pathway for the waste held in the IWS has not yet been determined; ultimately, this will be a decision for the Australian Government to make. However, given that the Lucas Heights site is not a suitable site for a disposal facility, an option to establish a repository for the permanent management of the waste on the Lucas Heights campus has not been considered.

If you or your team have any questions or would like to arrange a meeting to discuss ANSTO's plan for the management of wastes held in the Interim Waste Store, please do not hesitate to contact [redacted]

Yours sincerely

Paula Berghofer
General Manager, Waste Management Services
Licence Nominee for the Interim Waste Store (F0292)

Australian Government

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30 June 2020

Dr Carl-Magnus Larsson
Chief Executive Officer
ARPANSA
PO Box 655
Miranda 1490

Dear Dr Larsson

RE: Intermediate Level Waste Management from the F0309 ANSTO Nuclear Medicine (ANM) Facility

Licence Condition 14 of ARPANSA Facility Licence F0309 to operate ANM provides that:

> *The licence holder must, by 30 June 2020, provide a report on:*
>
> *a) Holdings of intermediate level waste (ILW) at the ANM Facility*
> *b) Projected future generation of ILW at the facility*
> *c) Plans for treatment of ILW generated at the facility including projected treatment in the SyMo Facility*
> *d) Plans for storage and disposal of the ILW that take into consideration the national policy and plans for full life-cycle management of radioactive waste*
> *e) Contingency plans should one or several components of the ILW management system not eventuate or fail.*

It is ANSTO's intention to meet this condition through the provision of this correspondence.

Holdings of intermediate level waste (ILW) at the ANM Facility

Current holdings of intermediate level liquid waste (ILLW) as of 21 May 2020:

- 1551 L from the ANM process
- 500 L transported from the Building 54 Mo-99 process.

All intermediate level solid waste (ILSW) is collected through aluminium retrievable bins (ARBs) and spent uranium filters (SUF) cups. These are transported from the ANM Facility to ANSTO's Waste Management Services section as part of routine waste management activities, and therefore fall outside the scope of the licence condition.

In the very unlikely event that the Intermediate Level Liquid Waste (ILW) tanks will reach capacity prior to SyMo becoming operational, ANSTO would seek to procure additional tanks with the support of government and in accordance with all regulatory requirements.

Projected future generation of ILW at the Facility

ILW generation rates at ANM per run are:

- 10 L ILLW
- 1 SUF cup
- Half an ARB is filled with ILSW.

The ANM Facility is undertaking a phased scale up of operational output from two runs per week [redacted]

Plans for treatment of ILW generated at the facility including projected treatment in the SyMo Facility

ILLW will be processed in the SyMo Facility where it will be chemically treated to form a solid, non-dispersible material. SyMo hot commissioning is on track to begin in 2024 using ANM ILLW. In line with the current forecasts for ANM production, SyMo will run up to four campaigns a year, treating up to 1250L of ILLW that yields up to 42 cans of solidified waste per campaign. These cans will be stored at ANSTO in appropriate conditions, as per current practice under the existing Waste Management Licence, prior to transportation to the National Radioactive Waste Management Facility (NRWMF) when it becomes operational.

SUF cups are encapsulated in storage vessels, which are stored at ANSTO. While it is anticipated that they will require minimal conditioning to meet storage requirements at the NRWMF, ANSTO is also investigating the feasibility of conditioning options.

Prior to transportation to the NRWMF, stored ILSW will be removed, sorted into different waste types, and processed into an inert solid form. This can be through size reduction (crushing, cutting metal or shredding plastic) or through heating to remove free liquid. The solid inert material will then be encapsulated into a larger drum and encased with cement. There are currently no suitable facilities to condition ILSW at ANSTO. A characterisation campaign will be undertaken over the next 24 months to better understand waste held in ARBs and to assist planning and decision-making for potential future facilities.

Plans for storage and disposal of the ILW that take into consideration the national policy and plans for full life-cycle management of radioactive waste

The current plan for the proposed National Radioactive Waste Management Facility (NRWMF) is that it will be operational before the end of the decade and that it will include an intermediate level waste storage facility.

In October 2017, the then Minister for Resources and Northern Australia, the Hon. Barnaby Joyce MP, advised you that the Australian Government is committed to identifying and developing a permanent disposal pathway for ILW and that a process to establish such a pathway would commence once appropriate institutional arrangements had been established.

The Australian Government is currently giving consideration to the nature of these arrangements; ANSTO is involved in these discussions. ANSTO and CSIRO are also working with Government to enable some early research to be conducted regarding the identification of potential disposal pathways.

Assuming that the ILW store is part of the NRWMF and that the processed ILW from ANM will be stored there, it is expected that packages would be transported to, and held at, the NRWMF while final disposal options are investigated and determined.

Contingency plans should one or several components of the ILW management system not eventuate or fail

ANSTO has more than 25 years of experience in the development of the Synroc technology, which gives us a high degree of confidence in this process. In the unlikely event that the SyMo plant is not available, ANSTO has identified cementation as an accepted mature technology within the nuclear industry for immobilisation of ILLW. Cementation is used in the United Kingdom, the Netherlands and Canada, and is a proven and approved technology. ANSTO has experience with cement encapsulation research.

SUF cups are encapsulated in a welded stainless steel storage vessel. ANSTO's current storage capacity for these vessels is anticipated to be filled by 2033; options would be either to build more storage facilities or to process the SUF cups at ANSTO. Both options are currently being investigated at ANSTO.

There are currently no suitable facilities to condition ILSW at ANSTO. Due to the anticipated timeframe for the establishment of the NRWMF, additional storage facilities at ANSTO likely will be required. Concept design for this has been completed, and ANSTO will shortly be commencing detailed design.

If you or your team have any questions or would like to arrange a meeting to discuss this plan, please do not hesitate to contact [redacted]

Yours sincerely

Ian Martin
General Manager
Licence Nominee ANM