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HIFAR Facility Licence Application Part B(7)

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PLANS AND ARRANGEMENTS FOR MANAGING POTENTIAL ENVIRONMENTAL IMPACTS OF THE HIFAR FACILITY

(REV. 0)

Prepared By

Australian Nuclear Science and Technology Organisation

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1 PURPOSE AND SCOPE

The purpose of this document is to describe how the larger ANSTO Environmental Management System (EMS), and embedded Environmental Management Plans (EMPs), account for the environmental aspects and potential impacts of the HIFAR facility in the Possess and Control period. This plan summarises specific elements of relevant EMPs, with explanatory comments specific to HIFAR in the possess and control period.

2 ENVIRONMENTAL MANAGEMENT PLANS

The current Environmental Management System's Environmental Management Plans (EMS-EMPs) with most direct relevance to HIFAR in the possess and control period are:

EMS-EMP-01 Airborne Emissions (updated in May 2006)

ANSTO's ALARA dose objectives are currently 20 microsieverts per year from all activities, with 50% of this from operation of HIFAR. HIFAR's contribution to airborne dose will reduce markedly in the possess and control period. Releases of ^{41}Ar have already ceased. Tritium continues to be released, although this will decline steadily.

EMS-EMP-02 Managing Radioactive Waste

In operation, HIFAR accounted for most of the concentration of tritium in liquid effluent discharged to the sewer under successive agreements with Sydney Water. This will continue post-closure, but is expected to decline during the possess and control period. Although tritium has contributed much of the measurable concentration of radioactivity (Bq/m^3) in liquid effluent from ANSTO, it has made very little contribution to the tiny modelled potential dose to people and the environment.

EMS-EMP-07 Fresh Water Use (currently being revised)

In 2001, HIFAR accounted for nearly 60% of ANSTO's fresh water usage, through its requirements for cooling water. Since final shutdown, HIFAR's water use has reduced to insignificant quantities.

EMS-EMP-08 Electricity Use

HIFAR's use of electricity represented approximately 400 MWh/month in 2006. This has halved since HIFAR's closure, and will reduce further when continuous shift coverage ceases.

The Safety Analysis Report, SAR (see Part C of this licence application) gives background detail on the environmental setting and history of HIFAR, as well as detailing the wastewater and ventilation systems that represent the primary potential links with the external environment. The SAR explains the airborne discharges, solid and liquid wastes expected to be generated in the possess and control period, and summarises relevant world experience with decommissioning similar reactors (*i.e.* DIDO and PLUTO).

3 ENVIRONMENTAL ASPECTS AND IMPACTS

Environmental Aspects (EAs) currently assessed as significant are listed in document EMS-S-02. The following significant EAs remain directly relevant in the possess and control period:

3.1 Solid Wastes

1 Activated and contaminated components from HIFAR

7 Legacy contaminated items and waste

Small amounts of low level solid waste may be generated in the possess and control period (*e.g.* obsolete or redundant radioactive sources, including past legacy sources), and these will be transferred to Waste Operations. More detail is provided in the 'Radioactive Waste Management Plan' (see Part B(4) of this licence application), and in the 'Plans for Safe Storage of Controlled Material and Maintenance of the HIFAR Facility' (part B(8)).

The SAR states that preliminary dismantling and refurbishment projects will result in significant quantities of solid waste materials, most of which will be non-active waste able to be sent to landfill.

3.2 Liquid Effluent

11 Low level liquid waste – tritiated water and decontamination washings from HIFAR

Small quantities of liquid discharges may be generated from preliminary dismantling activities (*eg* from decontamination work), and any discharge to the sewer will be in accordance with the current Trade Waste Agreement with Sydney Water. Further detail is given in the Radioactive Waste Management Plan.

3.3 Airborne Emissions

15 Stack emissions of tritium from HIFAR

The SAR details the expected sources of tritium. During the initial dismantling and refurbishment activities, tritium will be released as tritiated water from drained internal surfaces of the primary cooling and helium circuits, as well as through evaporation of small pockets of trapped D_2O liquid.

As noted in the most recent E-Report [1], tritiated water vapour released to air readily exchanges with rainwater and other surface waters and is present at low levels in stormwater and groundwater at ANSTO. Investigation of anomalous tritium concentrations in stormwater (Jan – Mar 06, peaking around the Australian Drinking Water Guideline level, but not considered significant for environmental or human health) were consistent with specific weather conditions promoting condensation and/or rain-out of tritium emissions in the area close to HIFAR.

Two of the EAs currently listed as significant, and which were specific to HIFAR, are redundant following reactor closure:

17 Stack emissions of ^{41}Ar from HIFAR operations

18 Potential accident - Airborne emissions from design basis accident for HIFAR

3.4 Other Aspects

Various other environmental aspects specifically relevant to HIFAR are currently identified in the database but are not considered significant and are therefore not listed here.

A non-radiological EA, recognised for the HIFAR cooling towers, relates to the potential metal and nutrient (P) contamination of concrete and nearby soil as a result of the chemistry required to limit algal/bacterial growth and corrosion – soil and concrete sampling has been carried out and the results will guide disposal.

The Environmental Aspects of closing HIFAR, and the subsequent possess and control period, are overwhelmingly positive, for example through reduced airborne emissions and associated dose.

Impacts - ANSTO's potential environmental impact from HIFAR (in the possess and control period) is very small and primarily relates to some ongoing airborne discharges of tritium, small quantities of liquid effluent discharges, transport of materials between HIFAR and Waste Operations, and non-radiological aspects of dismantling external structures such as the cooling tower structures.

The SAR identifies a Reference Accident for HIFAR in the possess and control period, assigning it a hazard classification of F1: "No potential for significant consequences outside the facility".

4 LEGISLATIVE, REGULATORY AND OTHER REQUIREMENTS

Legislative, regulatory and other requirements (LROs) are listed in the searchable WEDEMS database.

Key legislative and regulatory requirements relating to environmental protection are listed in ANSTO's annual E-Reports. Those with most relevance to HIFAR in the possess and control period are:

- Australian Radiation Protection and Nuclear Safety Act 1998 and Regulations (1999)
- ARPANSA Airborne Radioactive Discharge Authorisation for ANSTO, 2001
- Trade Wastewater Consent Agreement (No. 4423) between ANSTO and Sydney Water
- Protection of the Environment Operations Act 1997 (NSW)

- ARPANSA Licence Conditions Handbook PART 2 Organisational Licence Conditions ARPANSA RB-STD-24-01 Revision 1. May 2001. ANSTO Handbook RB-STD-24-01 Rev.1

HIFAR is the subject of a range of ongoing legal and/or regulatory requirements identified within the WEDEMS database. Many of these requirements are taken from the ARPANSA Licence Handbook and Airborne Radioactive Discharge Authorisation for ANSTO.

ANSTO is committed to written reporting of its environmental performance to government, its regulator and the public through its Annual Report, Corporate Social Responsibility (CSR) report and the Environmental and Effluent Monitoring report series (E-Reports). The E-Report series fulfils the ARPANSA licensing requirements in respect of annual environmental reporting for all of ANSTO's facilities.

5 OBJECTIVES AND TARGETS

The currently determined EMS Objectives and targets are listed in document EMS-S-03.

The following objectives and targets have been formalised according to EMS procedures:

Objective - to minimise any potential environmental impact associated with the possess and control period prior to HIFAR decommissioning.

Target(s)

- 75% reduction in airborne emissions of Ar-41 and tritium through commissioning and sole operation of OPAL
- Maintain total alpha, beta and tritium activity of effluent less than specified in Trade Waste Agreement with Sydney Water
- Quantify and characterise annual solid low-level radioactive waste arisings to enable a strategy to be developed to reduce the amount of waste generated
- Quantify water use at ANSTO facilities to provide a realistic baseline for determination of continual improvement – 6 months after OPAL is fully operational. *NOTE: ANSTO has gathered baseline data on water usage at the LHSTC, beginning with a water audit conducted in 2001*.

6 OPERATIONAL AND PHYSICAL CONTROLS

ANSTO operates a Quality Management System (QMS; known as ABMS), which provides the basis for a structured approach to management of activities and services. Most of ANSTO is certified to the AS/NZS ISO9001 standard.

Technical Services and Facilities Management has responsibility for the possess and control period and eventual decommissioning of HIFAR. Operational controls (*i.e.* the HIFAR QMS), responsibilities and training are explained in the 'Plan for Maintaining Effective Control' (see part B(1) of this licence application).

The SAR also notes that projects undertaken during the possess and control period will be assessed using ANSTO Risk Assessment protocols. For most projects this will involve preparation of a submission to the Safety Advisory Committee (SAC) which includes assessment of potential environmental impacts.

Physical controls over the primary potential links with the external environment (*i.e.* the wastewater and ventilation systems) are explained in the SAR. .The wastewater from the HIFAR Facility is directed to one of two delay tank systems that will be maintained following the shutdown of the reactor. The ventilation system passes air through filters to capture any dust or active particles before being exhausted to the atmosphere.

7 ENVIRONMENTAL MONITORING AND AUDITING SCHEDULE

7.1 Environmental Monitoring and Reporting

- A schedule of Environmental Monitoring at the LHSTC is published annually in the E-Report series, *eg* [1].
- The current weekly schedule of tritium monitoring for HIFAR stacks will be maintained.

Consistent with experience from DIDO and PLUTO and with previous shut-down levels from HIFAR, tritium emissions increased somewhat immediately after HIFAR's closure. This is not expected to noticeably affect the modelled airborne dose to the public, given tritium's small contribution to dose.

- Monitoring of ^{41}Ar will be maintained for a period sufficient to demonstrate cessation of its discharge.

Airborne emissions of ^{41}Ar from HIFAR fell from a median of 2.5 TBq/week, in the six months prior to its closure, to levels considered undetectable for the two months immediately post-closure. Historically, Ar-41 made a significant contribution to the modelled potential dose to the airborne critical group, and this very small dose (maximum ~0.005 mSv for 2005-06 [1]) will therefore fall even further.

7.2 Auditing

Internal auditing of the Environmental Management System is scheduled according to risk. Records of audit outcomes and follow-up are maintained in the ANSTO's records management system, Docushare.

External auditing of the Environmental Management System is maintained through an ongoing certification program with NCS International and scheduled in accordance with JAS-ANZ requirements.

8 MANAGEMENT REVIEW

This document will be reviewed annually.

9 INTERNATIONAL BEST PRACTICE

As part of its commitment to environmental protection, ANSTO has an Environmental Management System (EMS) that is certified to the AS/NZS ISO14001 standard.

10 REFERENCES

1 Environmental and Effluent Monitoring at ANSTO Sites 2005-2006. ANSTO/E-761, Australian Nuclear Science and Technology Organisation, Sydney. 74pp