Australian Government

Nuclear-based science benefiting all Australians

HIFAR Facility Licence Application Part D

Document ANSTO/06/749/4, rev. 0

LIMITS AND CONDITIONS FOR THE HIFAR FACILITY IN THE POSSESS AND CONTROL PERIOD

(Rev. 0)

Prepared By

Australian Nuclear Science and Technology Organisation

May 2007

REVISION SHEET		**Document No.:** ANSTO/06/749/4, Rev. 0			
		Print name, date and sign or initial			
Revision Number	Description of Revision	Prepared	Checked/ Reviewed	Approved	Agreed
0	Original issue	R Hutchison Simon Bastin	P Sirkka	J Rowling	Con Lyras

CONTENTS

1 PURPOSE AND SCOPE

This document constitutes Part D of a licence application for a Facility Licence, made by the Australian Nuclear Science and Technology Organisation (ANSTO[1]) for the shutdown HIFAR Facility, in accordance with the requirements of the ARPANS Act 1998 and Regulations 1999 as amended. [1, 2]

This document should be read in conjunction with other parts of this licence application.

This Application seeks to obtain a Facility Licence authorising ANSTO to Possess or Control the shutdown HIFAR Facility. This Facility is defined as a nuclear installation under the ARPANS Act.

Although no operations will take place on the facility, certain limits and conditions are imposed on the facility and the activities to be undertaken during the period the licence is in force. This specifies those limits and conditions.

2 DERIVATION OF THE LIMITS AND CONDITIONS

The Limits and Conditions (LCs) for the HIFAR facility are derived from the following:

- The OLCs for the operational HIFAR facility [3] as examined in the HIFAR Safety Document (HSD). The proposed LCs were derived from the review made in the SAR (Part C of this licence application) and also based on the rationale discussed in the Table provided below.
- Review against the guidance of the ANSI/ANS - 15.1 - 1990 [4], IAEA Safety Series No. 35 [5] and the draft IAEA Safety Standard DS261 [6]

Note that, in general, design features, such as materials of construction and shielding arrangements in a facility can have an effect on safety, if altered. Such design features are not directly operational in nature, however, and therefore are not reflected in the LCs.

The following table outlines which OLCs were omitted from the proposed LCs and which were retained, and provides the rationale for this decision. The Table also refers to the proposed new LCs, where applicable.

OLC Sections/Subsections	Rev. No.	Not applicable/ Partly Applicable
1. INTRODUCTION	9	Amended to suit new licence (refer LC 1.0)
2. DEFINITIONS	2	Amended to remove definitions no longer applicable (refer LC 2.0)
3. SAFETY LIMITS AND LIMITING SAFETY SYSTEM SETTINGS		
3.1 Safety Limits 3.1.1 Fuel Plate Temperature 3.1.2 Reactor Aluminium Tank Pressure Limits 3.1.3 Reactor Containment Building Pressure Limits	0	Omitted. None of these safety limits are applicable. The fuel has been removed, the RAT is open to atmosphere; and the containment is to be disabled.

[1] Note that Definitions of the Terms and Acronyms used throughout this document are provided in the Glossary in Part 0 of this licence application.

OLC Sections/Subsections	Rev. No.	Not applicable/ Partly Applicable
3.2 Limiting Safety System Settings	1	Omitted. Not applicable, because these safety systems are no longer required.
4. LIMITING CONDITIONS FOR OPERATION **4.1 Reactor Core** 4.1.1 Reactivity 4.1.1.1 - Minimum Critical Angle 4.1.1.2 - Maximum Critical Angle 4.1.1.3 - Reactivity Shutdown Margin 4.1.1.4 - Reactivity Accounting Error 4.1.1.5 - Rig Reactivity Worth 4.1.1.6 - Reactivity Addition By Rig Failure 4.1.1.7 - Approach To Critical 4.1.2 Fuel 4.1.2.1 - Fuel Element Type 4.1.2.2 - Hollow Fuel Element Inserts/ Thimbles 4.1.2.3 - U235 Investment 4.1.2.4 - Fission Burn Up 4.1.2.5 - Safety Rod Drops During Core Movements 4.1.2.6 - Plant Status During Core Movements 4.1.2.7 - Fuel Element Temperature 4.1.3 Power 4.1.3.1 - Reactor Power 4.1.3.2 - Fuel Element Power 4.1.3.3 - Reactor Power Fluctuations 4.1.3.4 - Fuel Element Boiling Onset Power	3	Omitted. None of the OLCs relating to reactor core, reactivity, fuel, or reactor power are relevant, because the reactor has been defuelled and is not an operational reactor.
4.2 Coarse Control Arms and Safety Rods 4.2.1 Core Movements During CCA and Safety Rod Maintenance 4.2.2 CCA and Safety Rod Maintenance 4.2.3 Safety Rod Availability 4.2.4 Safety Rod Release Testing 4.2.5 CCA Insertion Times 4.2.6 Coarse Control Arm Lifetime - Cadmium 4.2.7 Coarse Control Arm Lifetime - Europium 4.2.8 Coarse Control Arm Mechanical Lifetimes - Europium	6	Omitted. None of the OLCs relating to CCAs or Safety Rods are applicable, since the CCAs and Safety Rods have been removed from the reactor core and no longer function as shutdown absorbers.
4.3 Instrumentation 4.3.1 Reactor Protective Instrumentation 4.3.1.1 - Reactor Protective Instrumentation for High Power Operation 4.3.1.2 - Reactor Protective Instrumentation for Low Power Operation 4.3.1.3 -Reactor Protective Instrumentation While Shutdown 4.3.1.4 – “Blank” 4.3.1.5 - Maintenance Of Safety Circuits 4.3.1.6 - Limits For Flux Monitoring Channels	3	Omitted. None of the OLCs relating to reactor neutronic instrumentation are applicable, since there is no fissile material in the core and therefore no possibility of neutron flux or criticality.

OLC Sections/Subsections	Rev. No.	Not applicable/ Partly Applicable
4.3.2 Core Surveillance Instrumentation 4.3.2.1 - Fuel Element Thermocouples 4.3.2.2 - Operational Recorders During Operation 4.3.2.3 - Data Acquisition System (DAS) 4.3.3 Low Flux Instrumentation 4.3.3.1 - Reactor Startup Using Low Flux Instrumentation 4.3.3.2 - Protection When Using Low Flux Instrumentation 4.3.4 Radiation Monitoring Instrumentation 4.3.4.1 - RCB Installed Area Radiation Monitors 4.3.4.2 - "Blank" 4.3.4.3 - Detection of Tritium and Fission Product Gases		Since tritium can be present in the reactor building, and various gamma sources are also present, these will be retained, but no fission products can be present. 4.3.4.1 is retained, and 4.3.4.3 is retained with modification (refer LC 3.1).
4.4 Emergency Core Cooling System	1	Omitted. The ECCS has no function for a defuelled dry reactor.
4.5 Heavy Water System	1	Omitted. There is no heavy water present in the reactor or reactor building.
4.5.1 Availability Of Shutdown Circulators 4.5.2 Heavy Water Circuit Inventories 4.5.3 "Blank" 4.5.4 Chemical Control of Heavy Water Circuit 4.5.5 Circuit Isolation 4.5.6 Valving for Reactor Operation 4.5.7 Leakage Of Heavy Water Into Light Water Circuit		
4.6 Helium Circuit 4.6.1 General Requirements of the Helium Circuit 4.6.2 Deuterium Concentrations in the Helium Circuit	1	Omitted. The OLC provisions are applicable to an operating reactor. On completion of D_2O draining, the helium circuit will be vented and be open to the active extract ventilation. Thus these OLCs are not applicable.
4.7 Graphite Space Gas 4.7.1 Graphite Space Gas Pressure 4.7.2 Graphite Space Helium Purity	1	Omitted. The graphite space is now open to the active extract and has no helium cover gas.
4.8 Secondary Cooling System 4.8.1 Cooling Requirements up to 24 Hours following Shut Down 4.8.2 Cooling Requirements after 24 Hours following Shut Down 4.8.3 Low Power Operation	1	Omitted. Since the reactor is not operational and there is no heat generation, there is no need for secondary cooling or shield cooling.
4.9 Shield Cooling Circuit	2	
4.10 Containment Systems 4.10.1 Containment Leak Rates 4.10.2 Containment Isolation Systems 4.10.3 Space Conditioning System 4.10.3.1 - Availability of SCS during Operation 4.10.3.2 - Availability of SCS during Shutdown 4.10.4 Normal and Active Extract 4.10.5 Standby Active Ventilation System	2	Omitted. Containment is not required since the reactor is no longer operational. The OLC provisions for Normal and Active Extract are only applicable to an operating reactor and hence not relevant now.

OLC Sections/Subsections	Rev. No.	Not applicable/ Partly Applicable
4.11 Electrical Power Systems 4.11.1 EPSS Line Supplies 4.11.2 EPSS Standby Supplies 4.11.3 ”Blank” 4.11.4 EPSS Instrumentation Power Supply System	3	Omitted. There are now no systems which require high integrity power supplies. The SAR shows that on failure of the ventilation system or on loss of power, the building must be evacuated. Normal emergency exit lights and emergency lighting will be used as per any conventional building.
4.12 Fuel Handling and Storage 4.12.1 Fuel Handling 4.12.2 Storage of Fuel	4	Omitted. Since there is no fuel in the facility, these are not applicable.
4.13 Irradiation Rigs and Experimental Equipment 4.13.1 General Requirements of Rigs 4.13.2 Rig Handling Requirements 4.13.3 Rig Surface Heat Flux 4.13.4 Maximum Rig Temperatures	4	Since the reactor is not operational, 4.13.1, 4.13.3 and 4.13.4 are no longer applicable and have been omitted from the proposed new LCs. 4.13.2 has been included in the proposed LCs because it is possible that rigs will continue to be moved during the P or C period (refer LC 3.2).
4.14 Shielding	0	Omitted. The OLC provisions are applicable only for an operating reactor and hence not relevant now.
4.15 Radioactive Discharges 4.15.1 Liquid Discharges 4.15.2 Airborne Discharges	3	OLC 4.15.1 has been deleted as it is not applicable after the removal of the No. 1 storage block cooling water. OLC 4.15.2 has been amended to suit the new conditions and incorporated into the proposed new LCs (refer LC 3.3).
4.16 Emergency Control Room	1	Omitted. The ECR is no longer required.
4.17 Radiological Hazards 4.17.1 Air Activity In the RCB 4.17.2 Fission Products in Helium Circuit	2	4.17.1 has been amended to suit the new conditions and incorporated into the proposed new LCs (refer LC 3.4). 4.17.2 is no longer applicable because the potential for FPs in the helium circuit has ceased. This OLC has been omitted from the proposed new LCs.
4.18 Stand-by and Emergency Equipment	1	Omitted. There is no equipment required in standby or for emergencies other than conventional building exit lights and lighting.

OLC Sections/Subsections	Rev. No.	Not applicable/ Partly Applicable
4.19 Ancillary Plant and Equipment	1	Omitted. There is no safety function of ancillary plant and equipment.
4.20 Minimum Plant Configuration	4	Omitted. There is no concept of MPC applicable to the reactor in this state.
4.21 Hazardous Materials	0	Since final closure, the potential consequences of scenarios relating to hazardous material in the reactor building have significantly reduced. This no longer needs to be an LC. However, good practice requires limits to be imposed on quantities of hazardous material in the building. Therefore this LC has been retained in the proposed new LCs but will be subject to review (refer LC 3.5).
5. ADMINISTRATIVE CONTROL **5.1 Plant Staffing**	0	Omitted. The current OLCs do not impose minimum staffing on the reactor in this state and no requirements are necessary for nuclear or radiological safety. Nevertheless, some requirements are needed for operational reasons and these will be placed in an appropriate procedure.

3 OUTLINE OF THE LIMITS AND CONDITIONS

The LCs have been formatted in a manner consistent with the IAEA Safety Guides and industry best practices. The proposed LCs (all revision 0) follow this short cover document.

4 REFERENCES

1 Australian Radiation Protection and Nuclear Safety (ARPANS) Act 1998

2 Australian Radiation Protection and Nuclear Safety (ARPANS) Regulations 1999

3 HIFAR Operational Limits and Conditions NTD/TN212

4 ANSI/ANS - 15.1 – 1990, 'The Development of Technical Specifications for Research Reactors'.

5 IAEA Safety Series No. 35 'Safe Operation of Research Reactors

6 Draft IAEA Safety Standard DS261, 'Operational Limits and Conditions and Operating Procedures for Research Reactors', Draft 4 February 2006