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Interim Waste Store Operating Licence Application

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(REDACTED VERSION)

INTERIM WASTE STORE OPERATING LICENCE

DESCRIPTION OF THE STRUCTURES, COMPONENTS, SYSTEMS AND EQUIPMENT

(Rev. 1)

Prepared By

Australian Nuclear Science and Technology Organisation

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0	Original issue	Project Manager, IWS (Construction), MPDO Safety & Reliability Adviser	Program Manger ECP IWS Area Supervisor	Heard Nuclear Services
1	Revised the document to incorporate comments from the SAC.	Project Manager, IWS (Construction), MPDO Safety & Reliability Adviser	Program Manger ECP IWS Area Supervisor	Heard Nuclear Services

CONTENTS

1 PURPOSE AND SCOPE

The purpose of this document is to describe the structures, systems, components and equipment that are installed in the Interim Waste Store (IWS) built at Lucas Heights Science and Technology Centre (LHSTC). This document is a part of the Operating Licence Application prepared in accordance with the ARPANS legislation [1, 2] and the ANSTO business arrangements. It specifically covers the issues referred to in the ARPANSA Nuclear Installation licence application form listing matters for authorisation to operate a controlled facility.

This Plan should be read in conjunction with the other plans and supporting documents comprising the Operating Licence Application, specifically, IWS-O-LA-SAR *Safety Analysis Report*.

2 BACKGROUND

The IWS is a purpose-built building for housing Intermediate Level Solid Radioactive Waste (ILW) returned from France (*and potentially also from the United Kingdom which is not included in this application*) following the reprocessing of HIFAR used fuel assemblies. The facility is an above-ground building located within the ANSTO site between the existing buildings 64 and 19, just to the north of building 61.

Australia is obliged under international contracts and agreements to accept return of this waste: in the case of the waste reprocessed in France, it must be shipped from France no later than December 2015. In the absence of a National Radioactive Waste Management Facility (NRWMF), ANSTO is obliged to store this waste as an interim measure until the NRWMF becomes available.

There will be two types of ILW returning from France, i.e. vitrified waste and technological wastes. The vitrified wastes is the waste that is immobilised in a vitreous form (boro-silicate glass matrix) within sealed stainless steel canisters and transported/stored in an engineered shielded dual-purpose storage and transport container (TN81 Transport/Storage Container)

The technological waste is produced as a by-product of the main reprocessing operation of the HIFAR used fuel assemblies. It is composed of protective clothing, mechanical components such as pumps, piping and valves). The technological waste will be cemented within steel drums and placed in 6 concrete shielded transport/storage overpacks. The concrete overpacks will be placed within a shipping container/transport frame and certified as IP2 transport package for shipment. The approximate volume of this waste is about 7m^3.

ARPANSA issued both Siting Licence and Construction Licence for the facility in November 2013 [6, 7] and now ANSTO is seeking authorisation to operate the facility. ANSTO Waste Operations (WO) group will operate the store after the authorisation is granted by ARPANSA.

3 STRUCTURES, SYSTEMS, COMPONENTS AND EQUIPMENT

The IWS is a steel structure building. There is an approach road to the building for entry and exit from the LHSTC. The building has two roller shutter doors for truck entry from the eastern end and exit from the western end. A 140t DGR crane is installed in the building. There are several building services installed in the store, e.g., mechanical ventilation, fire alarm radiation monitor, lighting system, drainage system, compressed air system, security system etc. The TN81 Transport/Storage Container is fitted with an inter-lid pressure monitoring system to monitor the pressure of the helium gas filled in the space between the primary and secondary lid. These are discussed below.

3.1 Description of the building and access road

The building has been designed for an Importance Level of 2 as per the Building Code of Australia. The steel structure of the building has been designed and constructed in accordance with the AS1170.1 2002. Other design parameters of the building are as follows:

- Dead loading as per material densities;
- Roof Live Load 0.25kPa

- The concrete building slab has been designed for 117t SWL TN 81 Package weight, at minimum 4400mm spacing (centre-to-centre). The design allows for the package to be located in any location as long as the minimum 4500 spacing is achieved.
- The slab has also been designed for 10.0kPa live load, in lieu of storage loads.
- Wind loads in accordance with AS1170.2: 2011;
- Serviceability wind speed = 35m/s
- Ultimate wind speed = 43m/s
- Earthquake loads in accordance with AS1170.4: 2007

The building has a footprint of 28.2 metres by 30.0 metres. The building is 21.0 metres high to enable the lifting of the tallest container (i.e. the TN81 transport/storage container) to a vertical position.

The perimeter walls will be precast concrete panels approximately 170 mm thick measuring 5 m in height from the floor level and fixed to a structural steel portal. The rest of the perimeter walls which is fixed on top of the precast concrete panels have been constructed with 200 mm thick insulated sheet-metal panel. The roof of the facility has been constructed from 150 mm thick insulated sheet-metal sandwich panel.

The concrete slab has been constructed with a rating to withstand a weight consisting of the loaded TN81 container in transport configuration (~115 tonne), its transport cradle and ancillaries, a prime mover and specialised trailer. The truck-trailer-cradle-container load will be driven into the IWS prior to the removal of the TN81 Transport/Storage container from the truck and then aligned to a vertical storage position.

There are small rooms at the south-east corner of the store. These are:

(a) Control room;
(b) Cleaners' room;
(c) Toilet; and
(d) Helium enclosure.

The layouts of these rooms are shown on the IWS architectural drawings [10, 12]. The IWS location and the store floor plan is shown in Figure 2 and 3.

3.1.1 Access Road

A section of the existing road outside the LHSTC fences area has been upgraded for the truck movement and entering the site from the eastern side of the fence. The preferred route at LHSTC has been determined and the road surfaces have been evaluated to determine upgrade requirements for such a heavy load. A specialist traffic consulting engineering firm will be engaged to carry out inspection, conduct modelling and provide construction advice for the road.

The truck transport route within LHSTC was determined after an initial assessment by a specialist logistics consultant followed by a detailed assessment by a traffic engineering consultant who conducted modelling of the transportation process using the three identified route options. The access road described above was found to be suitable.

3.2 Description of the wastes

There will be two types of intermediate level solid wastes stored in the IWS. Upon arrival from France in late 2015, these waste items will be stored (see the floor plan in Figure 2):

(a) One TN81 transport/storage container loaded with vitrified waste canisters; and
(b) Technological waste drums.

The wastes items are briefly described below.

3.2.1 TN81 transport/storage container

There will be one TN81 transport/storage container in the store and it will contain the vitrified waste canisters (i.e. CSD-U) from the reprocessing of the HIFAR used fuel in France. The overall outside dimensions of the TN81 transport/storage container are:

(a) length: 7,215 mm; and
(b) external diameter: 2,150 mm.

The maximum weight of the TN81 transport/storage container loaded for transport is about 115 tonnes.

Detail description of the TN 81 transport/storage containers and vitrified wastes are provided in the IWS Safety Analysis Report [3] and the Storage Safety Analysis Report prepared by AREVA [4].

3.2.2 Technological waste storage container (DV78)

There will be six technological cemented ILW drums (i.e. CBF-C2), placed within concrete over pack which will be transported in an ISO container IP2 package (DV78) from France. The ISO container will be stored directly on the concrete floor. Each CBF-C2 drum has the following characteristics:

(a) Overall dimensions: Diameter 1,000 mm x height 1,500 mm
(b) Maximum weight: 4,000 kg

The maximum total weight of the ISO container loaded with six CBF-C2 drums is about 24,000 kg [.

Further description of the technological waste items is provided in the IWS Safety Analysis Report [3] and CBF-C2 specification provided by AREVA [5].

3.3 Description of the systems and equipment

3.3.1 Crane

The IWS building crane is an overhead dangerous goods (DG) rated crane (i.e., 140 tonne DG means the total capacity of 175 tonne). It is designed to the requirements of *Australian Standards 1418 - Cranes Hoists and Winches*.

The crane is rated to safely lift the heaviest container (i.e. TN81 Storage/Transport Container) which is stored in the IWS. The crane features double girder, end carriages and the main crab. The main crab contains main hoist complete with a primary brake and a secondary brake which are mounted directly onto the gear box. Secondary brake is engaged by the speed encoder which is also mounted on the drum. The hoist drum supports a single rope.

(a) Safety features

The vertical travel of the hoist is controlled by the limit switches. Crane will also be supplied with an electronic data logging unit which keeps records of lifting frequency, loads and durations. Crane will be operated via a remote control with an additional pendent (backup).

Secondary brake is an additional safety feature added by ANSTO which exceeds the requirements for the Dangerous Goods cranes as per AS1418. Crane has been designed to withstand seismic event with following peak accelerations of 0.19g (vertical) and 0.28g (horizontal).

(b) Crane coverage

The crane has coverage of approximately 2.5 m from the southern and northern side walls (i.e. cross travel) and approximately 5 m from the eastern and western side walls (i.e. long travel).

ANSTO Lifting Equipment Approvals Officer (LEAO) from Nuclear Mechanical Section coordinated the design and procurement of the crane from a specialist crane supplier. The installation of the crane inside the building was undertaken by the crane manufacturer in coordination with building contractor and ANSTO LEAO. The crane has been commissioned as part of the IWS construction and commissioning work.

3.3.2 Building ventilation system

IWS has been equipped with both natural and mechanical ventilation system. During normal condition (i.e. when the room ambient temperature is below 28^{o} C), it will be ventilated naturally. In this mode, the outside air will enter the store via the wall mounted louvres and leave the building via the roof mounted turbine ventilators (8 off). The louvres (4 off) are installed at the floor level and fitted with cleanable electrostatic air filters.
When the room ambient temperature is above 28^{o} C, the mechanical ventilation system will be automatically activated and the booster fans (8 off), which are mounted on each of the turbine ventilators will be operated automatically. The booster fan(s) can be operated manually anytime from the switchboard mounted in the IWS.
Layout of the roof mounted ventilators is shown on the mechanical services drawing [11] and the louvres are shown on the architectural plan [12].

3.3.3 Area radiation monitors

Area radiation monitors will be installed in the facility to monitor in the unlikely event of an increase in dose rates. The dose rate on the surface of the TN81 transport/storage container is expected to be near background radiation levels. Similar dose rates are expected on the surface of the ISO container. Elevated dose rates are not expected in the IWS storage area and radiation monitors are only in place to provide an additional radiation safety backup system.

3.3.4 Inter-lid pressure monitoring system

The inter-lid space between the primary and secondary lid of the TN81 Transport/Storage Container is filled in with helium gas. The three pressure sensors of the monitoring system measure the gas pressure in the space continuously. The signals from the pressure sensors are logged and can be displayed on monitors located in the control room. The operating procedure of the monitoring system is described in the [9].

3.3.5 Nitrogen and Helium gas supply

Nitrogen and Helium gas will be required for the secondary lid mounting process. There is an enclosure for storing the gas cylinders outside the IWS. The enclosure is accessed from the outside of the store. The gas pipework is run from the gas cylinders to the point of use inside the IWS. The helium gas pipework is designed and constructed with the approval from the ANSTO *Piped Gas Systems Approvals Officer* in accordance with the approved procedure [8].

3.3.6 Other building services

The following services will be provided in the facility:

- Water supply for fire fighting (fire hydrants and Fire hose reels);
- Sewerage and active drainage system (i.e. B line);
- Stormwater connections from roof guttering and downpipes and surface runoff from the immediate building surrounds;
- Electricity – power supplies for systems and equipment, including lighting, the crane, area radiation monitoring, emergency and exit lighting, automatic fire detection and occupancy warning/PA system;
- Telecommunications/data services – telecommunication facilities with links to other on site facilities, including the computer network;
- Security systems and alarms – installation of security/access control interfaced with the existing ANSTO site wide system; and
- Compressed Air – this will be supplied from the site supply system.

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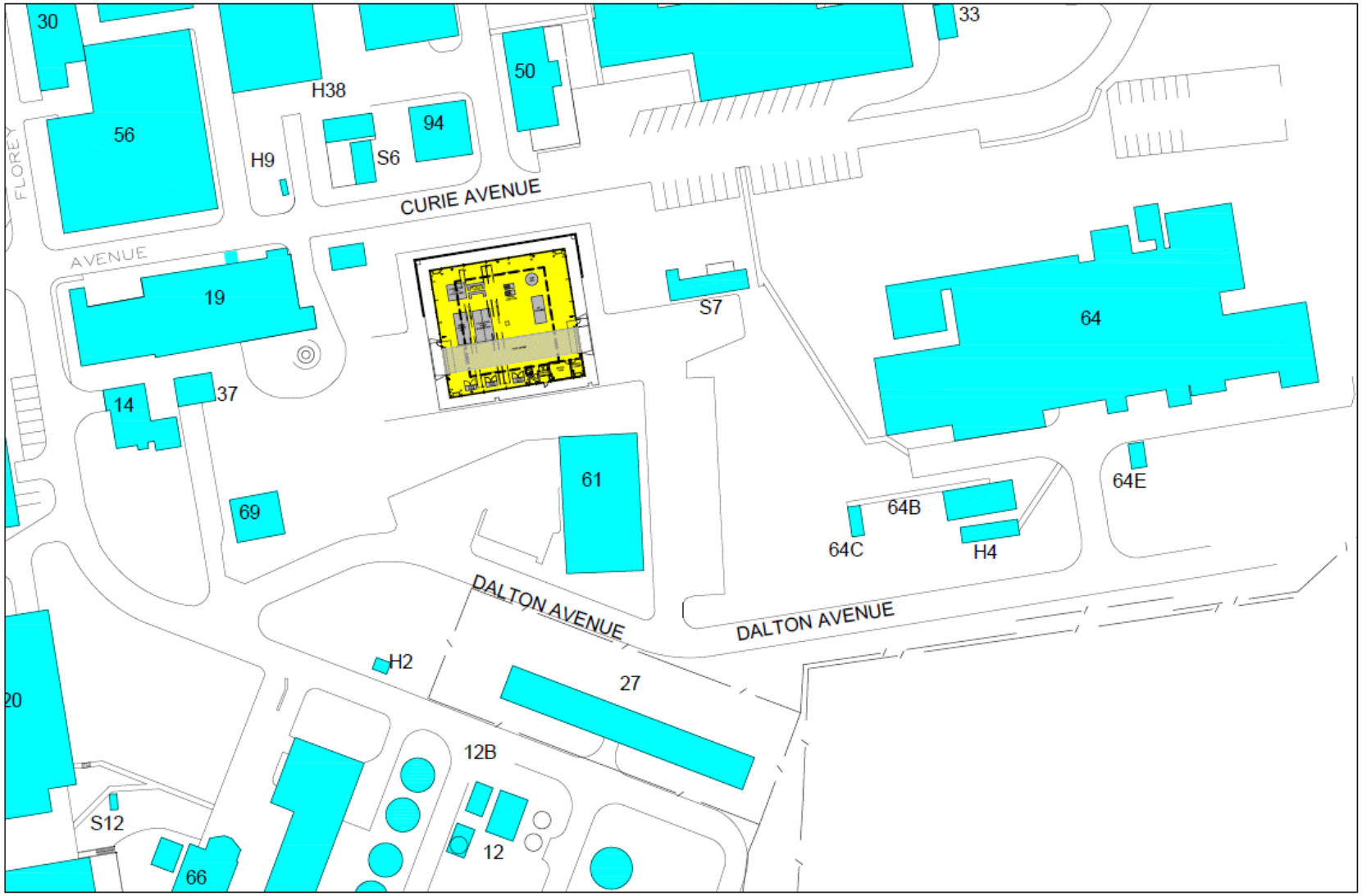


Figure 1: IWS location

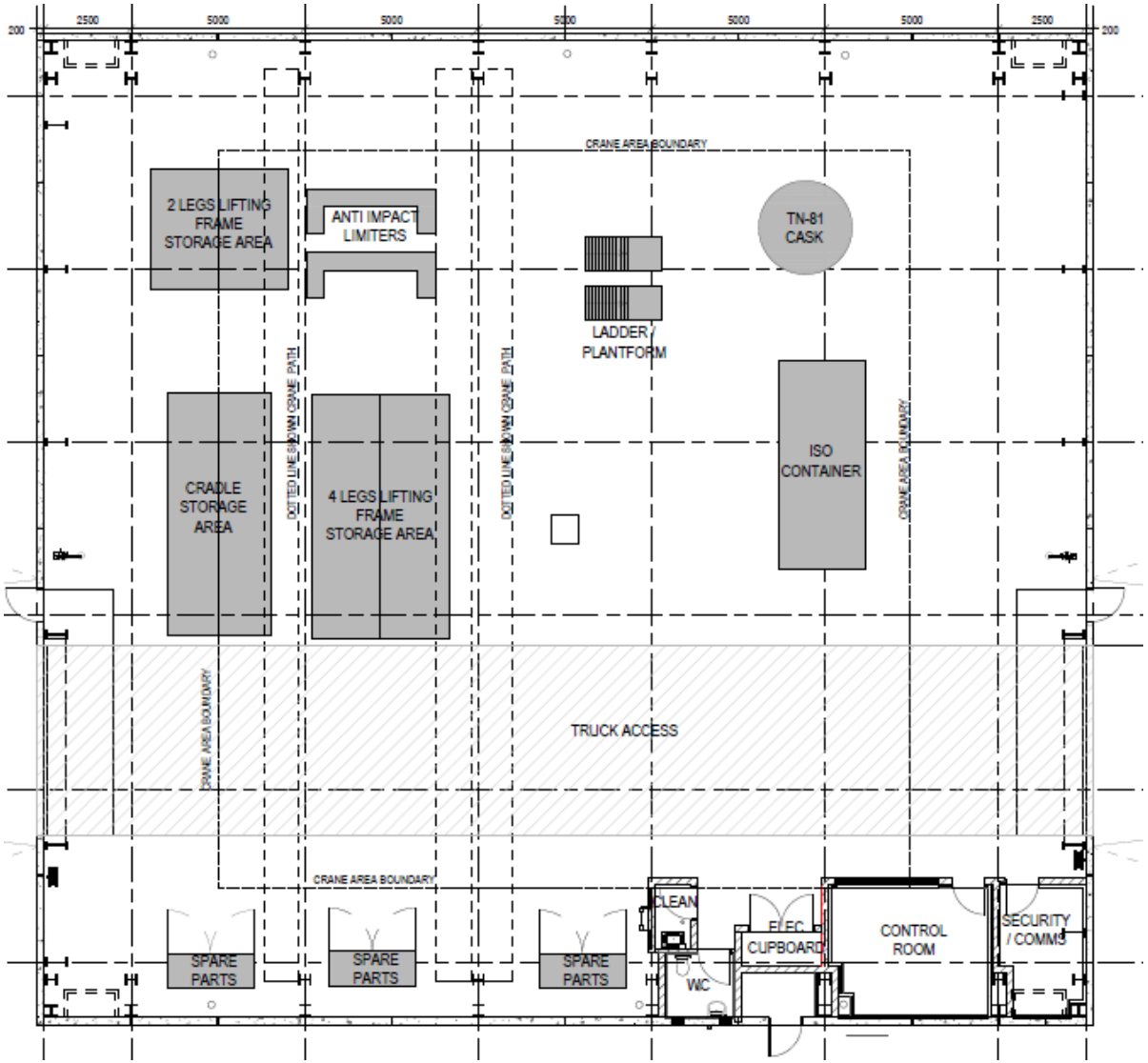
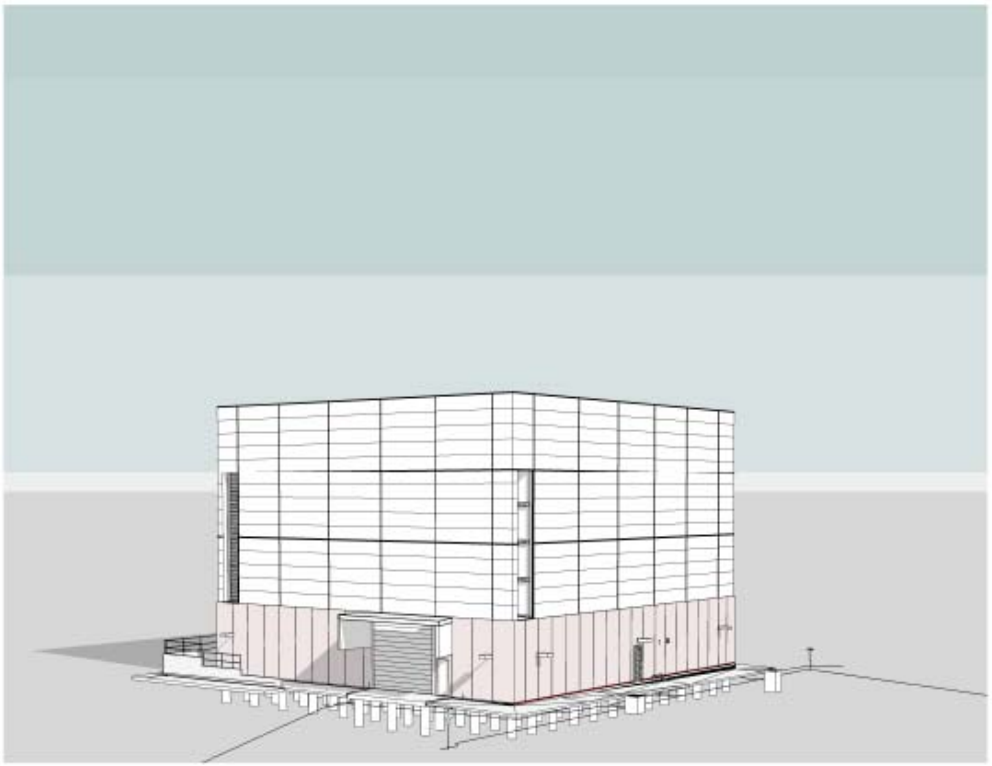


Figure 2. Floor plan of the IWS facility



AERIAL PERSPECTIVE
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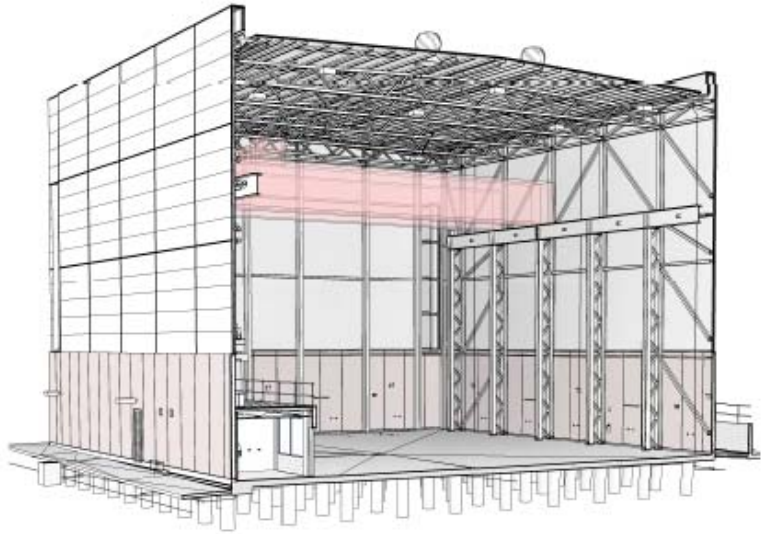

SECTION PERSPECTIVE
NOT TO SCALE

Figure 3. Aerial Perspective and Cross Section of the IWS

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