Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Reactor Pool and Service Pool		
4.56	4.5.1 Reactor Pool and Service Pool	The reactor pool contains the core, core associated structures, the Reflector Vessel, and the water inventory. The service pool provides ….	The reactor pool water (within the Chimney) is connected to the Control Rod Room (CRR) by means of the CR drive mechanisms and fuel element clamp mechanisms. There is thus a mechanism for draining the core, which has to be considered in the seismic design, volume and leak tightness of the CRR. This is a key design area.
			Response: This has been recognised in the design as a key design area. ARPANSA comment noted.
4.57	4.5.1.2 System Categorisation.	The reactor pool, service pool, the pool penetrations, the CRR and the CRR door are all Safety Category 1, Seismic Category 1	The reliance on a single CRR door is questioned. For such an important feature should consideration be given to dual barriers.
			Response: The Control Rod Drive Room (CRDR) door is a diverse and redundant barrier to the various seals on the penetrations through to the reactor pool. Therefore there is a dual barrier; one of them is the penetration through the pool and the second is the CRDR door.
4.58	4.5.1.3. Safety Functions	The canal provides a means of isolating the pools for inspection and maintenance.	The use of the Transfer Canal for Reactor Pool inspection is self evident since all the fuel can be stored in the Service Pool. What happens to spent fuel if inspection of the service pool is required?
			Response: The spent fuel would need to be removed if the service pool had to be drained (assuming that there were not so few spent FAs that they could be stored in the reactor pool).

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	Reactor Pool and Service Pool		
4.59	4.5.1.4 Codes and Standards	The Reactor Pool, Services Pool and Transfer Canal are all designed to ASME III, Division 1, Subsection ND.	The ASME Code is stated to be used as a guide for design, construction and testing. More information is needed. What parts of the code are used and what are excluded?
			Response: The Reactor Pool, Service Pool and Transfer Canal are all designed to ASME III, Division 1, Sub-section ND. Class 3 Components. The code is used as a guide for design, fabrication, inspection and testing for "Atmospheric Storage Tanks" exclusively.
4.60	4.5.1.5 Reactor Pool	The pool liner is manufactured from low carbon austenitic steel (6mm wall thickness and 12 mm base thickness). It is fixed to the concrete by attachment to carbon steel stiffener rings that are anchored to the concrete.	It is not at all clear why carbon steel stiffener rings are used. It increases the likelihood of corrosion and complicates the attachment (by welding) to the SS liner. The use of carbon steel needs justification. Why not SS stiffener rings?
			Response: It is not necessary to use SS in the stiffener rings. The carbon steel rings will not be welded directly onto the pool SS liner, but instead there will be SS 304L plates in between. This prevents a dissimilar-metal weld to the pool liner. The use of carbon steel in contact with concrete is a standard, proven and widely used constructive solution. See Section 4.5.1.5.2.1; paragraph before last on page 4.5-4.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Reactor Pool and Service Pool		
4.61	4.5.1.5.2.2 Penetrations to the Reactor Pool.	Maintenance of the core integrity is the main design aim for penetrations below and above the siphon breaks. Double seals are claimed for penetrations that are below the siphon breaks (refer to figs 4.5/10, 4.5/11, 4.5/12 and 4.5/13).	The CRR door seal is claimed to be a double seal. How this is achieved is not clear since there is only a single door provided.
			Response: The door has a double seal around its perimeter with a facility for leak testing of the interspace – this is shown clearly in Figure 4.5/12.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Reactor Pool and Service Pool		
4.62	4.5.1.5.2.2 Penetrations to the Reactor Pool --Below siphon breaks but outside core Chimney	All the PCS and instrumentation penetrations are above the siphon break, but there are some process penetrations below the siphon breaks associated with the Second Shutdown System discharge line, and the RCPS. These penetrations go through the reactor pool bottom and to the CRR. The seal assembly is two static O-rings for each pipe.	These penetrations are outside the core chimney area, and leak into the CRR. The volume and leak tightness of the CRR thus is of great importance to limit the level drop in the reactor and service pools. This highlights the importance of the CRR door and other CRR penetrations.
			Response: This is addressed in the provision of a double seal in the CRDR door and associated leak testing of the interspace between the seals. ARPANSA comment noted.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Reactor Pool and Service Pool		
4.63	4.5.1.5.2.2 Penetrations to the Reactor Pool Below siphon breaks but inside core chimney.	Five control rod drives, sixteen fuel clamp fasteners and four grid fasteners extend through the pool into the CRR. All leakage from these is directly from the chimney. These penetrations have multiple seal arrangements (see fig4.5/7, fig4.5/8 and 4.5/9).	There is a dependence on novel dual mechanical seals for these penetrations. These seals will have to be subject to rigorous testing before and after installation. It should cover seismic testing, and misalignment, poor installation, ageing and environmental tests to determine their leak tightness performance under degraded conditions. Please discuss the proposed testing program.
			Response: The proposed seal arrangement is typical of penetrations to vessels with low-pressure characteristics. Please note that this is a very low-pressure seal and that ETRR-2 has a similar design. The proposed testing program will be developed during the detail engineering phase and will be included in the FSAR.
4.64	4.5.1.5.2.2 Penetrations to the Reactor Pool Control Rod Drive Room Connection	The CRDRC is a stainless steel cylindrical structure (6mm thickness) embedded in the concrete block between the pool and the CRR (see Figs 4.5/5and4.5/6).	The CRDRC houses the CR and fuel element penetrations that pass into the CRR. While basically a passive system its method of embedment and fixture to the core structures is an area of important detail engineering.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Reactor Pool and Service Pool		
			Response: The importance of this component has been considered in the design. ARPANSA comment noted
4.65	4.5.1.5.2.2 Penetrations to the Reactor Pool Control Rod Drive Safety Room door	The CRR door is a novel design shown in Figures 4.5./10, 4.5/11 and 4.5/11. It is a single door but it has double seals around the perimeter. The volume of the CRR is 58.7 m3, which limits the potential drop in the pool level to 4m.	The door is designed for 2 bar to withstand the reactor pool water column. The pressure retention should also be established for the CRR structure and the piping and cabling penetrations of the CRR wall. It is noted that the CRR can be drained to the Effluent Disposal System. This connection needs to be Safety Category 1 since it could inadvertently drain the CRR.
			Response: The CRDR design is similar to that for ETRR-2. Other penetrations into the CRDR will be tested. Note that the drain connection is not permanent. Normally this connection is closed with a valve and a cap

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	Reactor Pool and Service Pool		
4.66	4.5.1.5.2.2 Penetrations to the Reactor Pool Neutron Beam Assembly Penetrations	There are five penetrations for the neutron beam assemblies. Two barriers are provided, namely the beam tube enclosure (see Fig 4.5/13) and a stainless steel enclosure plate at the reactor block external face.	The design arrangements are standard for research reactors. One issue that needs consideration is the possible bypassing of some of the seals during beam tube maintenance and/or experimental changes. Please discuss.
			Response: During beam tube maintenance with removal of the shutter assembly, the fuel will be removed from the reactor core. After beam tube maintenance operations, a test will be carried out to verify the leak tightness (seal tightness).

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	Reactor Pool and Service Pool		
4.67	4.5.1.5.2.5 Reactor Pool Leak Detection	The pool is provided with a leak detection system. A continuous geo-textile cloth band is wrapped around the outside of the pool, and is covered by a watertight geo-membrane film to form each detection area. Collection gutters and drain pipes are provided and the location of a leak can be identified.	The source of a leak can be detected but there is no suggestion that leaks can be repaired. The use of the geo-textile and geo-membrane should be validated for the range of thermal stress and other environmental conditions expected over the life of the plant. Please provide additional information.
			Response: This is being developed in the detail engineering phase and will be included in the FSAR.
4.68	4.5.1.5.3 Reactor Pool Materials	The Reactor Pool is made from ASTM A-240 Gr 304 L stainless steel. The stiffening rings are made from carbon steel ASTM A36, but will not be in contact with the pool water.	See earlier query on the use of carbon steel and request for reasons that stainless steel not used. Is ASTM 304 L stainless steel the usual choice for pool liners, since there are many other austenitic stainless steels with superior properties (AISI 316 and AISI 321)? Please state reasons for the material choice.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Reactor Pool and Service Pool		
			Response: See response above to question 4.60. ASTM 304L is considered appropriate for the application in view of the benign conditions (demineralised water at 50ºC) and in the light of experience. Note that at present the availability of SS 304L in the international market is better than for other steels (e.g. 316L). Moreover INVAP has used 304L in other projects with good results (e.g. ETRR-2 and the NUR).
4.69	4.5.1.5.4 Design Evaluation of the Reactor Pool	Designed to ASME III to withstand hydrodynamic, hydrostatic and mechanical forces. The thickness of the pool walls and bottom are respectively 20% and 405 greater than required by ASME.	It is not clear if the ASME III provides for load combinations involving the Safe Shutdown Earthquake. The seismic analysis of the pool and the mechanical attachments to it are important since the pool liner supports many Safety Category I components. Please discuss.
			Response: Seismic analysis is explicitly taken into account. The ASME III Code provides for consideration of loads arising from earthquakes. Please refer to Section 4.5.1.5.5. See also Chapter 2, Section 2.6.1.7.2.1.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Reactor Pool and Service Pool		
4.70	4.5.1.5.5 Seismic Analysis of the Reactor Pool	The levels of component are defined to protect against a LOCA . Level 1 components constantly support the hydrostatic head and will be verified for peak load including seismic. Level 2 components only see peak loads if Level 1 fails (See Fig 4.5/16).	Please clarify, from a seismic design perspective, why a distinction is made between Level 1 and Level 2 components. The detailed design has not been completed yet. It needs the information from the floor response spectra to establish the accelerations at the natural frequency of the components.
			Response: Level 1 and Level 2 components do not have any difference from the seismic design perspective. The classification is a means of identifying whether a component normally supports hydrostatic pressure or not. For example, the CRDR door is identified as Level 2 meaning that under normal conditions it does not have to support the hydrostatic head. All components, Level 1 and 2, will be qualified including all load combinations. This means that they will be analysed with both hydrostatic pressure and seismic loads taken into account. Because all Level 1 and Level 2 components are Seismic Category 1, the seismic load will be that derived from SL-2.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Reactor Pool and Service Pool		
4.71	4.5.1.6 Service Pool	The Service Pool is a rectangular cross section stainless steel tank (6 mm wall thickness and 12 mm base thickness). It is embedded in concrete and connected to the Reactor Pool by the Transfer Canal. (see Fig f4.5/1 to 4.5/4)	Like the Reactor Pool it is anchored by carbon steel stiffening rings. Please justify the choice of material.
			Response: See response to Question 4.60
4.72	4.5.1.6.3 Penetrations to the Service Pool	All penetrations are above the bottom of the Transfer Canal, and are part of the Reactor and Service Pool Cooling System. The siphon breakers are at the bottom level of the Transfer Canal. The leak detection and pool material are the same as for the Reactor Pool.	See questions relating leak detection and choice of pool material.
			Response: See responses to Questions 4.60 and 4.67

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Reactor Pool and Service Pool		
4.73	4.5.1.6.6 Design Evaluation of the Service Pool	The structural design, design methods and standards of the Service Pool are identical to those used for the Reactor Pool. Structural integrity of the Service Pool during the SSE will be evaluated during the detail design.	See previous comments on the Reactor Pool design evaluation. It is surprising that the seismic analysis has not yet been done for this pool (or the reactor pool).
			Response: The seismic analysis for the Reactor and Service pools was performed during the preliminary design. The verification of the seismic design will be performed during detail engineering. See also question 4.69.
4.74	4.5.1.7 Transfer Canal	The Transfer Canal permits movement of irradiated fuel and other materials between the Reactor Pool and the Service Pool. It also permits isolation of the Service Pool to inspect the Reactor Pool. It is made from 6mm thick AISI 304 L stainless steel.	See previous comments with respect to selection of material and leak detection of the Reactor and Service Pools. It is not clear if carbon steel will be used as a stiffener in the same manner as for the other pools.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Reactor Pool and Service Pool		
			Response: See responses to Questions 4.60 and 4.67
4.75	4.5.1.9 Fabrication of Components	The pools and canal will be fabricated to standards identified in Ch.2 of the PSAR. Dye penetrant, X-ray and leak tests will be undertaken .	Where will these components be fabricated, eg is it in Argentina or Australia? How will it be ensured that transportation stresses do not exceed any of the pools' stress limits?
			Response: These components will be fabricated in Australia. The stiffening rings are required partly for transport purposes. Stress analyses to be undertaken during detail engineering will support the lifting and handling manoeuvres during manufacturing, transport and installation. For transport a special support base will be used.