Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.1.	10.1.1	'Since some FAs in the first cores have uranium contents lower than normal FAs, the criticality calculations performed using the nominal values are conservative for those FAs'	This statement should be verified in a view of the following questions: 1) Are you going to keep the mentioned FAs with lower uranium contents in the operating reactor about the same time as those with normal (standard) uranium contents? 2) What is the expected difference in burn up of FAs with lower uranium contents comparing with those with normal (standard) uranium contents?
			Response: 1) Yes. Following operation with the first core, standard FAs will be loaded each shutdown until all non-standard FAs are discharged. 2) The discharge burnup for FAs with lower uranium content ranges from 11% for the first three FAs to 46% for the last three FAs. The discharge burnup for the equilibrium core is 46%
10.2.	Figure 10.1/1	Fuel Assemblies Management	1) What is the FA capacity in the reactor pool storage rack? 2) What is the FA capacity in the service pool storage rack? 3) What will happen with those three FAs being transferred to the service pool storage rack during each fuel loading? Simple estimate shows that each year you may increase the number of FAs in the service pool storage rack by about 3x12=36. 4) Are you going to use a transport container for fresh FAs to transport them from fresh fuel storage room to reactor hall area?
			Response: 1) The capacity of the reactor pool storage rack is given in Section 10.1.6.3 and Figure 10.1/8 2) The capacity of the service pool storage rack is given in Section 10.1.6.4 and Figure 10.1/9 3) Agreed; the function of the service pool spent fuel storage rack is to store spent FAs. 4) This process is described in Section 10.1.5.1 para 4(e)

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.3.	10.1.3 Safety Functions	'a) Prevention of … transients of unacceptable reactivity'	What kind of 'transients of unacceptable reactivity' may happen in a subcritical fuel storage system?
			Response: No transients of unacceptable reactivity can occur if the system is designed (1) for correct normal operation, (2) to withstand all lifetime abnormal occurrences.
10.4.	10.1.3 Safety Functions	'b) Prevention of spent FA damage'	Why only spent FAs? What about fresh FAs?
			Response: Agreed. A safety function of the fuel storage systems is to prevent damage to both fresh and spent fuel.
10.5.	10.1.4 Reference Documents, Codes and Standards	References on ARPANSA's criticality safety policy	An appropriate reference should be considered on ARPANSA's criticality safety policy expressed in the recent report: S. Zimin and T. Mountford-Smith "Criticality Safety Audit of Australian Nuclear Science and Technology Organisation" ARPANSA, RB-ASR-52-00, Draft, March 2001
			Response: ANSTO has not received the audit report and was unable to take it into account.
10.6.	10.1.5.1 Introduction	FA database	Do you plan any duplication of the FA database to protect it from possible loss due to computer system failure? For instance, do you plan to keep a complete copy of FA database on a file?
			Response: Appropriate means for protecting the FA database will be used. The methodology to be applied will be decided at Detail Engineering
10.7.	10.1.5.2 Design Bases	'The following criterion is verified: Keffx0.9 for normal operation and accident conditions'	'Keffx0.9' is not a criteria, it is just a multiple of Keff and 0.9. Did you mean under criteria 'Keffx0.9' the condition Keff < 0.9? If 'Yes', please clarify the following: 1) Does your Keff include all estimations of uncertainties, including 3σ and nuclear data uncertainty? Please discuss the inclusion of uncertainties in calculation of Keff. 2) Did you conduct a sensitivity analysis to estimate nuclear data uncertainty?

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: This is a typographical error. It will be corrected in the next revision of the PSAR. The correct text is "$K_{eff} < 0.9$" as suggested. 1) Statistical uncertainties and uncertainties in the model were taken into account in the verification of the criterion $K_{eff} < 0.9$ as follows: Statistical uncertainty: 3σ = ±0.003 Tolerances: mechanical: ±0.0025 Loading: ±0.0035 Total tolerances = ±0.006 These numbers will be included in the next revision of the PSAR. Moreover, the calculations were done assuming no impurities, which gives a conservative result. 2) No sensitivity analysis was undertaken nor is it required. It is sufficient to use a well-founded sub-critical limit in the computer code when assessing the system. The limit of 0.9 for MCNP, an extensively benchmarked code used by INVAP on the design of proposed fuel, is very conservative.
10.8.	10.1.5.3 Fresh Fuel Storage Room and Rack	'The rack geometry guarantees the Keff values specified in the design basis without the need for neutron absorbers in the rack'	Keff should be clearly specified here
			Response: Noted. K_{eff} is specified in Table 10.1/1 which is mentioned in Section 10.1.5.3.1
10.9.	10.1.5.3.1 Fresh Fuel Storage Criticality Calculations	Criterion that a given storage configuration is safe	Refer to question 10.1.5.2 It is not appropriate to use 'Keff*0.9' as the criteria for criticality safety. Clear Keff < 0.9 condition should be explicitly shown every time you discuss the criteria of safe storage of FAs.
			Response: As noted in response to Question 10.7, this is a typographical error.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.10.	10.1.5.3.1 Fresh Fuel Storage Criticality Calculations	Criticality alarms	Does AR-4 Series (Regulations for Argentine Republic) require criticality alarms to be installed in the Fresh Fuel Storage Room and in the vicinity of the Service Pool Storage Rack of the replacement reactor?
			Response: Regulations for Argentine Republic do not require criticality alarms
10.11.	10.1.5.3.1 Fresh Fuel Storage Criticality Calculations	Boundary conditions	Four bounding surfaces perpendicular to the XY plane were set as reflective. How have the other two surfaces, parallel to XY been simulated in your 3-D computer model?
			Response: On the other two surfaces 40 cm additional to the actual length of the FA was modelled with air or water, and with a free boundary beyond the 40 cm
10.12.	10.1.5.3.1 Fresh Fuel Storage Criticality Calculations	Abnormal situations	While the normal storage situation can be adequately modelled by an infinite lattice of FAs, it may not be enough for abnormal conditions such as fire combined with partial flooding or earthquake combined with partial or complete flooding. Have abnormal configurations been considered? Eg: 1) The maximum storage capacity of FA (not infinite model) completely flooded. Rational: water reflector may be more effective for reflection then water mixed with steel frames and FA. 2) A few FAs piled on a floor completely flooded, say 10 FAs, 25 FAs and 50 FAs. Rational: earthquake combined with flooding. 3) The maximum storage capacity of fresh FA (not infinite model) partially flooded and partially disintegrated. Rational: fire combined with partial flooding. Did you consider a need for criticality alarms in the fresh FA store? Have the criticality assessment results been independent of peer review?

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: The design of the RRR adopts the Double Contingency Principle: Process design should, in general, incorporate sufficient safety features or factors to require at least two unlikely, independent and concurrent changes in process conditions before a criticality accident is possible. No (credible) single failure shall result in the potential for a criticality accident. 1) This finite model calculation will be performed during Detail Engineering phase. 2) This is a double contingency, not considered in the design 3) This finite model calculation will be performed during the Detail Engineering phase. There is no requirement for criticality alarms in the fresh FA storage area. The results were reviewed by the Argentine Regulator (ARN).
10.13.	10.1.6.2 Design Bases	Criterion 'Keffx0.9'	Refer to question 10.1.5.2
			Response: Comment noted – see first part of response to Question 10.7.
10.14.	10.1.6.2 Design Bases	'The pitch between elements is appropriate to ensure sub-criticality in conjunction with cadmium …'	Has cadmium degradation after 40 years of operation been taken into consideration? How does it effect your criticality calculations?
			Response: Section 10.1.6.4 paragraph 3 stated that Cd depletion will be negligible in both the reactor and service pool storage racks. This is supported by INVAP past experience in similar projects. However, a calculation of Cd depletion will be performed during the Detail Engineering phase.
10.15.	10.1.6.4 Service Pool Spent Fuel Storage Rack	Cadmium depletion	Has cadmium depletion been taken into consideration? If yes, please provide the calculations and the results.
			Response: See previous response to Question 10.15.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.16.	10.1.6.5 Spent Fuel Storage Criticality Calculations	Criticality calculations for abnormal conditions	Should be clearly identified and discussed in the PSAR. Are heavy cask movements over the spent fuel storage rack allowed?
			Response: The will be undertaken during Detail Engineering, as noted in Section 10.1.6.5 paragraph 5 No, the movement of heavy casks over the spent fuel storage rack is not allowed.
10.17.	10.1.6.6 Management of Damaged Fuel	' … and. If necessary, …'	Misprint
			Response: Agreed – this will be corrected in the next revision of the PSAR.
10.18.	10.1.7.4 Spent Fuel Storage Shielding	Dose rates in Table 10.1/3	What is the uncertainty of these calculations? Was uncertainty included in the tabulated data or not?
			Response: Calculations at the stage of Preliminary Engineering have the objective of obtaining an order or magnitude of the dose that is acceptable. Based on INVAP design experience this approximation will produce an uncertainty in the required shielding of the order of 10%. Accurate calculations will be performed in the Detail Engineering phase. Uncertainty was not included in the tabulated data at this phase.
10.19.	10.1.7.5 Transfer Canal Shielding	Dose rates in Table 10.1/4	What is the uncertainty of these calculations? Was uncertainty included in the tabulated data or not?
			Response: See previous response to Question 10.18.
10.20.	10.1.7.5 Transfer Canal Shielding	Dose rates in Table 10.1/5	Please describe the rig used for calculations. What is the uncertainty of these calculations? Was uncertainty included in the tabulated data or not?

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: Rig used for calculations: Uranium mass of 250 grams, enriched to 2.2% by weight. 1250 grams of aluminium were considered in the model. The main contribution to the source term was from the fission products. The total source after one hour of decay was 9.72×10^{15} photons/sec and 4.55×10^{15}MeV/sec. Uncertainty was not included in the tabulated data at this stage.
10.21.	Table 10.1/1	'Standard deviation is * 0.001'	Please clarify the meaning of *.
			Response: Correct text is 'Standard deviation is 0.001'.
	Fire Protection		
10.22.	10.2.1 Introduction	The Fire protection systems… protect the reactor systems critical to safe shutdown.	What is the Safety Category and rationale for the choice of category for the fire protection system? 10.2.3 indicates it is a Cat 2 system.
			Response: The approach to safety categorisation is given in Chapter 2, Section 2.5. The fire protection systems are generally allocated to Safety Category 2 since they provide a significant additional contribution to nuclear safety. They are not allocated to Category 1 because they do not form a principal means of ensuring nuclear safety (ie they don't shutdown the reactor, ensure core cooling or form a barrier to the uncontrolled release of radioactivity).
10.23.		The IAEA document "Fire Protection in Nuclear Power Plants – A Safety Guide Safety Series No 50-SG-D2 (Rev.1)" was also used …	What aspects of the IAEA Guide have been adopted in the fire protection system design?

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: All parts of the Safety Series 50-SG-D2 (Rev 1) have been used as appropriate during the design, including: Fire Protection Design Approach, Fire Prevention Philosophy and Fire Detection and Extinguishing
10.24.	10.2.1 Introduction	Management In Use such as work method statements, hot work permits and standard operating procedures	What is meant by the terms: "Management In Use"; "work method statements"; and "hot work permits"?
			Response: Management in use refers to the management of risks and hazards by means of management and procedures. Work method statements are written procedures for approval prior to commencement of work. Hot work permits are written permission to perform hot work, ie welding, in areas with potential risks.
10.25.	10.2.1 Introduction	The systems protect the facility against the effects of fire by: …	The majority of the measures listed are not preventive measures, but mitigation measures. Please discuss the fire prevention methods included in the design

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: Fire prevention design features (included in Section 10.2): Adequate sizing of equipment and cabling to avoid overloading Earthing and over-current protective devices on critical equipment Avoidance of storage of flammable materials in significant quantities within the building. Building layout and zoning, location of fire barriers and the selection of reactor materials to minimise internal fire hazard. Use of non-combustible or self-extinguishing furnishing wherever possible, such as metallic shelves, cupboards, file cabinets and desks. Regulation of tasks and operations to minimise human errors that might represent a fire hazard. Preventive maintenance on systems and components to prevent failures that might represent a fire hazard. Use of non-flammable products and solvents for cleaning tasks wherever possible. Where flammable products are required, their use will be restricted to a minimum, their possession and storage duly authorised by the Safety Division and their storage restricted. Fire prevention features of electrical equipment in Chapter 2, Section 2.9.1.4
10.26.		Earthing, overcurrent and overpower protective devices…	Please provide the reference document for an "overpower" device.
			Response: The text will be amended in the next revision of the PSAR to read "Earthing and overcurrent protective devices …"

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.27.		Permanent radiation shielding constructed from fireproof materials (where possible)…	Where is it impossible to provide fireproof material?
			Response: Neutron shielding in the RBH and NGH is usually hydrogenous material, typically borated paraffin wax, in a steel container. The reactor building will not contain significant quantities of such material. In the next revision of the PSAR the words "(where possible) will be replaced with "or an alternative engineering solution adopted".
10.28.		Baffles on sprinklers to prevent discharge onto important switchboards.	What is the criteria for a switchboard to be "important"?
			Response: Category 1 and relevant Category 2 switchboards
10.29.	10.2.2 The New South Wales Fire Brigade	The ANSTO emergency plans will provide for rapid notification to the New South Wales Fire Brigade.	What specific procedures have been and will be developed for the NSWFB during the life of the RRR (from Construction to Decommissioning)?
			Response: No specific additional procedures are required. The RRR will be connected to the existing alarms system that has multiple arrangements in place for contacting the NSW Fire Brigades. The principle ones are a direct line to NSW Fire Control at Alexandria and the ability to dial 000 either through the ANSTO PABX or through an external exchange. During construction some temporary alarm/public address points will be located on the construction site connected to the existing LHSTC Site Alarm system. A range of permanent and auto alarms will be provided during operation and decommissioning of the RRR.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.30.	10.2.4 Fire Loads	A detailed analysis of the potential fire loads within the facilities was undertaken to establish the potential types and extent of fires possible.	Please provide the reference and report.
			Response: Section 10.2 provides the relevant information and conclusions that result from the fire hazard analysis. This analysis will be developed during the detail engineering phase and the final results will be presented in the FSAR.
10.31.	10.2.6.1 Design Basis	All fire indicating and control equipment will be SSL listed and approved.	What does SSL stand for?
			Response: "Scientific Services Laboratory". See also reference in Section 10.2.6.5. SSL are the organisation responsible for testing of fire detection systems in order to verify compliance with Australian Standards. They maintain a register of SSL approved equipment.
10.32.	10.2.6.1 Design Basis	The Fire Design Manual details the design and installation requirements of the fire protection and detection systems.	Please provide the reference and manual.
			Response: Section 10.2 presents the main concepts that will be covered by the fire design manual. This manual will be developed at the start of the detail engineering phase and will be reported in the FSAR

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.33.	10.2.6.2 System Description	Sub-fire indicator panels are located in the Emergency Control Centre (ECC).	What is a "sub-fire"? Does the term "sub-fire indicator panels" mean that the panels in the ECC rely on the main panel in the MCR to function correctly? Is the "Emergency Control Centre" the ANSTO Emergency Control Centre, ANSTO Site Control Centre, or RRR Emergency Control Room?
			Response: A sub-fire panel is a panel installed local to a risk or hazard and communicates with the main fire indicator panel. A Sub Fire Indicator Panel is one that sends its alarm signals via a main FIP to outside monitoring centres. The panels in the ECC do not rely in the MCR panel to function correctly. The Main FIP for the RRR sends signals to the main Fire Panel in building 53 and to the building 53 site security system; which is used by ANSTO to monitor fire alarm signals around the ANSTO site. The current design provides for a Remote Display Unit in the RRR Emergency Control Room. This RDU provides duplicated controls and display of the functions on the RRRP Main FIP. It does not duplicate Fire Fan Controls provided at the Main FIP as these are for Fire Brigade Control of designated smoke exhaust and supply air fans outside of the containment. It is proposed that the B53 Site Control Centre will monitor fire alarms from the RRR complex and a sub-fire indicator panel be located in the APS post near the Emergency Control Room.
10.34.	10.2.6.2 System Description	In containment areas air handling units remain running but are provided with on/off/auto switches for manual override.	Does this meet the requirements of a Containment System? Where are the on/off/auto switches located? Is it a hardwired or software based system?

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: This system meets the requirements of a containment system because the air handling units (AHUs) are inside the containment and are not required under accident conditions. Energy management inside the containment is achieved by means of the CERS that is triggered automatically by the First Reactor Protection System (both being Safety Category 1 systems) when the containment is isolated. There is no reliance on the operation of the few AHUs inside the containment that are not part of the CERS. On/off/auto switches are located next to the fans or in the nearest switchboard for industrial safety/emergency use. On/off/auto switches are also located on the main Fire Indication Panel in the building entry (Visitors Building). The system is hard wired.
10.35.	10.2.6.2 System Description	The ANSTO site control centre will manually call the New South Wales Fire Brigade if necessary.	What are the criteria for deciding to contact the NSWFB?
			Response: The site alarm monitor will contact the NSW Fire Brigades when either: A phone-in report of an actual fire is received An auto fire alarm is confirmed as "real" by the Site Operations Safety Supervisors or other responding staff
10.36.	10.2.6.3 Point Smoke Detection	This is an addressable system using redundant path communications.	What is meant by an "addressable system"?

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: "Addressable" is the terminology used within the fire industry to describe fire detection systems that use analogue smoke sensors connected via a by direction loop back to a loop driver card which then connects back to the Fire Indicator Panel. Each detector is individually monitored for current status and is regularly polled by the main Fire Panel, via the loop card. As each detector has its own distinct numerical "address", the system can be set up to carry out specific functions in relation to signals from individual detectors. As the detectors are connected via a bi-directional communications loop cutting of the cable at a single point will not cause loss of communication with any of the detectors on that loop
10.37.	10.2.6.3 Point Smoke Detection	Control rooms and equipment rooms that will be protected by gaseous or water mist fire suppression systems will be provided with…to activate the suppression systems.	Are the control rooms equipped with automatic or manual actuation systems? Is there a difference between a "water mist" system and a conventional sprinkler system?
			Response: The actuation systems in the control rooms are automatic for Inergen and manually activated for dry-pipe water systems. The Inergen Systems will be designed for Automatic operation, once a single smoke detector has operated and the Vesda system registers Level 2 Alarm. However there will be a local electrical push button and manual release lever in the event that the detection systems had not operated Yes there is a difference; water mist is a high suspension aerosol system whereas conventional sprinklers emit large water droplets. However, Inergen has been selected during the detail engineering phase and water mist has not been used anywhere in the facility.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.38.	10.2.6.4 Multi-point Aspirated Smoke Detection	The MASD and point smoke detectors are interfaced to the gas suppression system sub-fire indicated panels to provide dual detector logic for gaseous fire suppression system activation.	Is this 1 out of 2 logic?
			Response: No. Both detectors must provide an alarm signal before the system will activate. This is to eliminate false alarm signals. Each Inergen protected room will have a minimum of two smoke detectors and one Vesda detector. The Inergen Systems will be designed for Automatic operation, once a single smoke detector has operated and the Vesda system registers a Level 2 Alarm.
10.39.	10.2.6.7 Evaluation	…the likelihood of its failure simultaneous with a fire is very low.	Please provide the reference.
			Response: The fire detection system monitors all connected devices continuously for fault conditions and will indicate at fault at all appropriate Sub fire indicator panels, the Main Fire Indicator Panel and back to the Building 53 control room. In addition fire detection systems are tested monthly, by Fire System technicians, in accordance with AS1851.10. Any faults that affect system operability will be identified and repaired. The likelihood of a new fault occurring at the same time as a fire is extremely low.
10.40.	10.2.6.7 Evaluation	Scientific Services Laboratory	What is the Scientific Services Laboratory?

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: SSL is a federal government laboratory responsible for testing of fire detection systems in order to verify compliance with Australian Standards. They maintain a register of SSL approved equipment.
10.41.	10.2.6.7 Evaluation	The system is standard and the only customisation will be in the software. The software is debugged during testing and commissioning.	What are the verification and validation processes for the software?
			Response: Each Fire Alarm Panel will contain generic software that has been tested and approved by SSL as part of the approval listing of that model of Fire Panel. The software contains logic variables that will be arranged to construct logic equations to provide various output functions from detectors and other input devices. These logic statements used in the final operation program of each FIP will be verified by testing each input device and ensure correct operation of related output devices. An Inspection and Test Plan with appropriate input and output check lists will be developed during detail engineering for each Fire Indicator Panel.
10.42.	10.2.6.7.1 Main Fire Indicator Panel Failure	The panel electronics are solid state and many of the functions previously derived from relay or discrete electronic componentry are now performed by the software. This leads to fewer and more reliable components and overall increased system reliability.	Please provide the reference.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: Input and Output device functionality is performed using logic statements within the Fire Panel processor as described in the response to Question 10.41 above rather than relay devices. The fire panels are tested by SSL in accordance with AS1603.4 which contains required reliability testing criteria for Fire Indicator Panel
10.43.	10.2.6.7.2 Loss of Normal power	The power supply for the fire indicator panel could fail however the panel is provided with integral batteries that will provide 4 hours of electrical power.	What is the supply for Normal Power?
			Response: The details of the Normal Power supply are given in Chapter 9.
10.44.	10.2.6.7.3 Sub-fire Indicator Panel Failure	A loss of a sub-indicator panel controlling gas fire suppression will mean the local loss of the suppression system.	The following gas suppression systems would be unavailable if the sub-indicator panel failed: Zone 7: Control Rod Drive Room; Zone 8: Auxiliary Instrument Room 0.242; Zone 9: Auxiliary Instrument Rooms 4.110, 4.111, 4.14; Zone 12: Communications cabinets in Instrument Room 10.03; Zone 14: Control Room 13.04, pneumatic cells; Zone 15: Emergency Control Room; Zone 16: Standby Diesel Generators, Standby UPS Rooms, Switchboard Rooms, battery rooms, Transformer Rooms. A number of these Zones contain Safety Category 1 systems. Has this been taken into account when determining the Safety Category of the fire protection system?
			Response: Yes, Category 2 is appropriate. See response to Question 10.22

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.45.	10.2.6.7.3 Sub-fire Indicator Panel Failure	A loss of a sub-indicator panel controlling gas fire suppression will mean the local loss of the suppression system.	Can a common mode failure render all gas fire suppression systems inoperable? What is the validation process for the fire protection system?
			Response: The diverse trigger means (automatic and manual) provide protection against common mode failures. With respect to validation please refer to the response to Question 10.44 above.
10.46.	10.2.6.7.5 Communication s Bus Failure	The communications bus will be run as a redundant path loop with isolators. This will limit the loss of detection capability.	What are the separation and isolation requirements? What Standards are relevant to separation of redundant communication paths for fire protection systems?
			Response: Refer to response to Question 10.36. AS1670 specifies separation and isolation requirements for addressable loops.
10.47.	10.2.6.7.6 Spurious Detector Operation	These systems will all be provided with double or triple interlocks.	What is the operational logic for these interlocks? Where is the design detail for the interlocks?
			Response: Preliminary information is provided in Section 10.2.7.4. Full design will be undertaken during detail engineering.
10.48.	10.2.7.1 Design Basis	NFPA	What is NFPA?
			Response: (US) National Fire Protection Association – see Glossary

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.49.	10.2.7.2 System Description	The fire load in the NGH will be generally low and egress from the hall will be compliant with the Building Code of Australia deemed to satisfy provisions.	Who "deems" the egress to satisfy provisions?
			Response: "Deemed to Satisfy" is a defined term in the Building Code of Australia and means that compliance with the Building Code may be achieved by meeting certain prescriptive requirements. If so this is "Deemed to Satisfy" the BCA. There will be an independent review of the BCA fire compliance – see Chapter 4.
10.50.	10.2.7.2 System Description	A fire in these rooms has the potential to break through the glazing and threaten the external cladding of the NGH. These rooms therefore include sprinklers and drenchers along the glazing. The visitors gallery over these offices will be similarly protected.	Can a fire in the NGH rooms lead to the failure of the roof and therefore the floor of the visitors gallery?
			Response: No; the room sprinklers should control any fire. In addition, the visitors gallery floor slab is fire rated.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.51.	10.2.7.2 System Description	The Reactor Hall will be provided with conventional sprinkler protection with a manual override. This allows remote fire control in the event of a release of radioactive material that would prevent fire brigade access.	Table 10.2/1 indicates that the Reactor Hall has a double interlocked pre-action sprinkler protection with manual operator intervention required to the containment areas. Is the system automatic with manual override or does it require human intervention to operate?
			Response: The system does require manual activation to open the final valve and release water into the system.
10.52.	10.2.7.2 System Description	The system will use fast response sprinklers with a response time index of 40 or less.	Please provide reference.
			Response: The details of the sprinkler system will be included in the FSAR.
10.53.	10.2.7.2 System Description	The system control valves and all stop valves will be monitored.	Are the Automatic Fire Detection, Automatic Fire Sprinkler Systems, Drenchers, and Medium Velocity Water Spray Systems independent systems?
			Response: Please refer to the response to Question 10.44. The Sprinkler Systems, Pre-action Systems, Water Spray Systems, Hydrants and Hose reels are all interlinked via the water supplies back to the two diesel pumps and the tanks. All of the suppression systems have a point where they can be operated without the fire indicator panels.
10.54.	10.2.7.3 Sprinkler System Classification	The sprinkler systems are classified as…	Please provide reference.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: Australian Standard AS 2118.1 Automatic Fire Sprinkler systems. Note that offices have been re evaluated as OH1 and Plant Rooms as OH1.
10.55.	10.2.7.4 Pre-action Sprinklers	Sprinkler discharge water within the confined area	Should "confined area" read "containment"?
			Response: Yes. This will be amended in the next revision of the PSAR.
10.56.	10.2.7.4 Pre-action Sprinklers	Containment areas are therefore provided with pre-action sprinklers with a manual override switch to eliminate the inadvertent release of water into the containment area.	The use of the wording "manual override" is misleading. The system requires manual actuation.
			Response: Comment noted; it will be corrected in the next revision of the PSAR.
10.57.	10.2.7.5.3 Malfunction of a Sprinkler Head	A solenoid failure will mean the loss of sprinkler protection to an entire area.	This is not "Fail to Safety" philosophy. If the solenoid fails, the activation of the system is still dependent on the smoke detectors and melting of a sprinkler bulb
			Response: There is a manual override. Loss of Solenoid does not mean loss of sprinkler protection to the area. Loss of solenoid means loss of automatic sprinkler operation. The pre action systems can be manually operated via mechanical valve releases
10.58.	10.2.7.5.6 Conclusion	The sprinkler system in NGH side bays will be conventional and less prone to failure. Such systems have a statistical reliability of 98%.	Are there sprinklers in the NGH? The System Description (10.2.7.2) suggests that sprinklers have not been provided. Please provide the reference for the reliability statement.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
			Response: The NGH has sprinklers in the East and West offices and positioned over glazed window along the offices and at view windows in the Reactor building. There are also sprinklers over the airlock doors leading into the Reactor beam Hall. The Fire Engineering Guidelines quote figures for the reliability of sprinklers as 95% for non-flashover fires & 99% for flashover fires. The Australian Standards "Sprinklers Simplified Handbook" state figures from Factory Mutual & Fire Protection Association of 95% reliability. HW Maryatt writes in "A Century of Automatic Sprinkler Protection in Australia & New Zealand 1886-1986". That sprinkler systems have a reliability of 98.87%.
10.59.	10.2.8.2 System Description	The drenchers will be supplied by an extension from the sprinkler pipe work.	The Drenchers are part of the Sprinkler System.
			Response: Agreed. Comment noted.
10.60.	10.2.8.4 Access Door between the Neutron Guide Hall and the Reactor Beam Hall	The access door will be normally closed, but if it is open and a fire is detected then it will be closed.	Is the door automatically closed on detection of fire or is operator action required?
			Response: The access door operates in a manner similar to an airlock with one of its two doors closed at all times. No automatic door closure is required.
10.61.	10.2.9.1 Design Basis	The use of water spray is standard practice in the USA and is recommended in the DoE fire protection manuals for Nuclear Plants	Is this accepted as best practice in the nuclear industry? What does the IAEA Guides suggest?

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	Fuel Handling and Storage System		
			Response: IAEA No 50-SG-D2 Para 609 (2) "Appropriate methods shall be used to protect filters from the effects of fire". No details or prescriptive requirements are given in this document.
10.62.	10.2.9.2 System Description	The deluge system will be activated by thermal detection but has a manual override	Is the system automatically actuated or is operator action required as per the Containment sprinkler system?
			Response: The design is for automatic operation with a manual override as opposed to manual activation.
10.63.	10.2.10.1 Design Basis	The Reactor Facility will have a grade 2 water supply…	What is a "grade 2 water supply"?
			Response: The continuation of the sentence explains that it is via two pumps drawing from a single supply as elaborated in BCA and AS2118.
10.64.	10.2.10.1 Design Basis	…with a new 150 mm diameter main running from the existing gravity water tower (described in Chapter 3 Section 3.2.7.1) to a tank by the cooling towers.	Does the existing water tower meet the seismic requirements? What are the seismic requirements of the water supply system generally?
			Response: No. Detail engineering work will include seismic assessment of the relevant sections of the water supply system.
10.65.	10.2.10.2 System Description	… in the fire control building.	This is the first mention of a "fire control building". Where is it located? Is it seismically qualified?
			Response: The paragraph will be amended in the next revision of the PSAR. The reference to "fire control building" will be deleted.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.66.	10.2.10.2 System Description	The diesel-driven sprinkler booster pump with bypass arrangement will be located near the cooling towers.	Where are the details for the diesel? It does not appear to be shown on any drawings provided.
			Response: This information will be developed during Detail Engineering and will be included in the FSAR. Additionally, note that it is a requirement for pumps fed from a pressurised water supply to have bypasses. As these pumps are fed from tanks, a bypass serves no purpose and will not be installed. Instead a Fire Brigade suction point is provided on the tank outlet line and a boosting point is provided after the pumps.
10.67.	10.2.10.3 Evaluation	The existing site water tower system outside the reactor site was qualified in 1983…	Please provide reference.
			Response: Reference is: Department of Housing and Construction, Report on B13 Water Tower.
10.68.	10.2.10.3 Evaluation	The pump set has a bypass providing un-boosted water around the pump set.	Is this an automatic bypass or operator initiated?
			Response: There is no bypass as explained in the response to Question 10.66. Instead, a Fire Brigade suction point is provided on the tank outlet line and a boosting point is provided after the pumps.
10.69.	10.2.10.4 Testing and Commissioning	Where double or single interlocked pre-action sprinkler systems are used…	Only double and triple interlocked systems are previously mentioned. Where are single interlocked systems used?

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	Fuel Handling and Storage System		
			Response: The statement should read "double and triple"; it will be amended in the next revision of the PSAR.
10.70.	10.2.12 Gaseous Fire Suppression Systems	Gaseous Fire Suppression Systems will be provided to Safety Category 1 electrical rooms and control rooms…	Should systems used to protect Safety Category 1 systems also be classified as Category 1?
			Response: No, Category 2 is appropriate. See response to Question 10.22
10.71.	10.2.13.2 System Description	In the event of fire in containment areas, the areas will be isolated and the hydrants will not be used for fire fighting. However, hydrants would be available for use by fire fighters to create a heat shield for search and rescue operations	To prevent the use of the hydrants for fire fighting will require administrative procedures. Will these be included in the NSWFB procedures? Is it correct that water would be captured in drainage tanks? (see 10.2.7.4 Pre-action Sprinklers)
			Response: This will not be contained in a NSW Fire Brigade Standing Operating Procedure. It will be included in an ANSTO Standing Operating Procedure for staff with responsibilities in an emergency. These may be RRR staff or Site Operations Safety Supervisors. Prominent notices will also be displayed on relevant hydrants. Yes, water will be captured in drainage tanks.
10.72.	10.2.16 Essential Power	Fire panels are provided with integral batteries and chargers. All fire systems not provided with back-up battery power will be supplied from the supply side of main switches.	Is power provided from the Normal Supply or Standby Supply?

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	Fuel Handling and Storage System		
			Response: All panels are battery backed and are supplied from normal power.
10.73.	10.2.17 Emergency Lighting and Exit Signs	The Standby Power Supply will provide power sufficient for 30% of the design lighting level.	Is this allowed for in Chapter 9 – Electric Power?
			Response: The electric power system allows for this.
10.74.	10.2.19 Emergency Planning and Training	…and Section 20.8.2 Emergency Training and Drills in general, including fire emergencies.	Section 20.8.2 makes no mention of fire emergencies. It does mention "emergency scenarios". Please provide reference.
			Response: Emergency scenarios include, among others, fire emergencies.
10.75.	Table 10.2/1	Reactor Building Level +13 (Containment)	It is indicated that the control room (13.04) is within the Containment – is this the MCR?
			Response: No, the sentence will be amended in the next revision of the PSAR. The MCR is outside the containment.
10.76.	Table 10.2/1	Reactor Building Level +13 (Containment)	What are the "pneumatic cells" used for?
			Response: Please, refer to Chapter 11, Section 11.4.5.3.
	Communications		
10.77.	10.1.1 Introduction	The objectives for PSAR Chapter 10 are …	These are general objectives that should be applicable to all of Chapter 10, however they are embedded here under the Fuel Storage and Handling System only. Please clarify.
			Response: Agreed. These are general objectives and should have been included ahead of Section 10.1.1. This will be amended in the next revision of the FSAR.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.78.	10.1.1 Introduction	To identify faults that are subject to detailed safety analysis in Chapter 16	Where exactly are the faults identified?
			Response: Refer to Chapter 10, Sections 10.2.6.7 and 10.2.7.5.
10.79.	10.3 Communications	The communication systems will comprise: a) Dedicated telephone communications system …	What Standards will this system be built to? Does this form part of the PAM?
			Response: Cabling: ASA TS 008 & AS 3080 Installation: ASA TS 009 & AS 3080/3086 It is a contract requirement to supply redundant PAM communication that would be to IEEE Class1E requirements. The telephone system may be used in this application but the systems to be used will be determined during detailed engineering.
10.80.		The communication systems will comprise: f) Video Surveillance system for the reactor building, auxiliary building and emergency control centre.	Where is the CCTV system discussed? Is this part of the Security Surveillance System? What Standards will this system be built to? Does this form part of the PAM? Does this form part of the Physical Security System?
			Response: The CCTV system is discussed at Section 10.3.4 and further detail will be provided in detail engineering. The security system CCTV is different from the PAM CCTV system.
10.81.	10.3.1 General	d) Each backbone node will consist of multiple network distribution cabinets with forced and air flow…	What is meant by "forced and air flow"?
			Response: The "and" is not required – this will be amended in the next revision of the PSAR.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.82.	10.3.1 General	f) Each distribution / concentration device will…	What is meant by "distribution / concentration device"?
			Response: It refers to a system of multiple hot swappable interface modules that form the backbone nodes.
10.83.	10.3.1 General	a) Provide the ability to have duplicate services and 100% redundancy for critical systems…	Where are the "critical systems" identified?
			Response: Critical in this sense refers to those links between areas that may be required to be accessed during emergencies management operations.
10.84.	10.3.2.2.1 PABX Telephone System	The emergency control centre will have a dedicated network rack that will be linked to the existing network. All communications…	Is the telephone system seismically qualified? What Standards are applicable to the communication system?
			Response: Refer to Chapter 2, Table 2.5/2, Systems 53.40 and 53.45. Standard AS 2220 for Emergency Warning Instrumentation System
10.85.	10.3.2.3 Wireless Headsets	The system will operate using high frequencies which will have negligible effect on other electronic equipment within the site.	Do the Headsets have communication with the MCR and ECR? Is the use of wireless headsets discussed in Chapter 13 – Conduct of Operations?
			Response: Yes, the headsets have communication with both the MCR and the ECR. The use of wireless headsets is not discussed in Chapter 13.
10.86.	10.3.2.4 Evaluation	The overall result is a voice communication system which will provide a high level of safety and reliability to support the operation of the reactor facility.	There is no mention of the PAM requirements (see 8.6.2.3 Requirement 3)
			Response: Comment noted.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.87.	10.3.2.5 Emergency Warning System	The Emergency Warning and Intercommunication System main panels and equipment racks will be located in the communications room of the main entrance building or within each hub to serve specific zones.	Will this equipment be seismically qualified?
			Response: The seismic qualification will be in accordance with the equipment's seismic classification. See Chapter 2, Section 2.5.
10.88.	10.3.4 Plant Visual Surveillance System	A digital Closed Circuit Television System (CCTV) is provided for monitoring process operations within the reactor building, beam hall and other key areas. The system is integrated with the Physical Security System.	This system also forms part of the PAM and Physical Security System – it should be designed as a Category 1 Safety System.
			Response: Some CCTV cameras are linked to the PAM and as such, they are classified as Safety Category 1. The rest of the cameras are not Category 1.
10.89.	10.3.5.3 Computer Data Network System	The Reactor Facility data network is a stand-alone system linked to the existing … ring-system.	How can the network be "stand-alone" and "linked to the existing" LHSTC network?
			Response: It is a stand-alone system in that if the site LAN is lost or unavailable, it does not affect the RRR facility LAN.

Question ref.	Section number and name	Topic	ARPANSA Comment, Issue or Question and ANSTO's Response
	Fuel Handling and Storage System		
10.90.	10.3.5.3 Computer Data Network System	All Communications Network equipment racks in each zone will be fitted with Uninterruptable Power Supplies (UPS) and fed from the stand-by power supply to ensure operation during power outages.	Comms UPS to be fed by the Standby Power Supply – is this clear in Chapter 9?
			Response: It is not mentioned specifically in Chapter 9 but the requirement has been considered and capacity is available.