

Westinghouse UK
AP1000® GENERIC DESIGN ASSESSMENT
Resolution Plan for GI-AP1000-ME-03
Mechanical System Pipework Design

MAIN ASSESSMENT AREA	RELATED ASSESSMENT AREA(S)	RESOLUTION PLAN REVISION	GDA ISSUE REVISION
Mechanical	Structural Integrity Radiation Protection Radwaste Environment Agency	2	0

GDA ISSUE:	Westinghouse is required to provide further justification for the pipework design of the AP1000® for systems important to safety. In particular Westinghouse is required to justify that the AP1000 system designs incorporate adequate isolation and drainage arrangements to enable all anticipated EMIT activities to be carried out in a safe and controlled manner.
ACTION: GI-AP1000-ME-03.A1	Westinghouse shall generate the arguments and evidence to justify that each isolation that proposes to use pipe freezing technology is ALARP. Westinghouse's proposal to use pipe freezing technology to provide process isolation in support of their planned EMIT regime is considered not to be good engineering practice for the anticipated isolation requirements for a new reactor design, but rather a technology utilised to recover from a scenario that has not been generally predicted. ONR considers that good engineering practice for a new modern NPP incorporates adequate engineered arrangements for anticipated and planned process isolation to support EMIT activities. ONR's expectation is for Westinghouse to review their design and either revise their proposal in line with ONR expectations or demonstrate with appropriate arguments and evidence that the anticipated process isolations that propose the use of pipe freezing technology are ALARP. With agreement from the Regulator this action may be completed by alternative means.
ACTION: GI-AP1000-ME-03.A2	Westinghouse shall generate the arguments and evidence to justify that EMIT isolations that rely on single valve isolations are ALARP. The IRWST isolation is provided by a single isolation

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	<p>valve to undertake EMIT of the injection squib valves. This does not achieve ONR expectations when considering the IRWST has a capacity circa 2100m3 and if the single isolation valve was to fail (in its isolation function) then a significant hazard would arise. The system design does not have any other provision to contain the fluid within the IRWST.</p> <p>ONR considers a system isolation first design choice is provided by a suitable valve arrangement, with double valve isolation being provided for systems that are subject to a significant pressure, or temperature, or where there is some other significant hazard e.g. a large volume of fluid is held back.</p> <p>ONR's expectation is for Westinghouse to review their design and either revise their proposal in line with ONR expectations or demonstrate with appropriate arguments and evidence that all anticipated isolations that propose to use single isolation that are the subject of either a significant pressure, temperature or some other significant hazard are ALARP.</p> <p>With agreement from the Regulator this action may be completed by alternative means.</p>
<p>ACTION: GI-AP1000-ME-03.A3</p>	<p>Westinghouse shall generate the arguments and evidence to justify that all process pipework designs are adequately engineered to provide drainage facilities to enable the anticipated EMIT activities to be carried out in a safe and controlled manner.</p> <p>Isolation of the motor operator valve to allow EMIT to be carried out on the 4th Stage Squib valves requires the downstream leg of fluid to be drained by ad hoc means i.e. splitting of flanges and use of temporary fluid collection containers. This is an example of the AP1000 design not incorporating adequate engineered arrangements for carrying out anticipated EMIT in a safe and controlled manner.</p> <p>ONR considers that a system design should incorporate adequate engineered arrangements to enable the process pipework to be drained in a safe and controlled manner.</p> <p>ONR's expectation is for Westinghouse to review their design and either revise their proposal in line with ONR expectations or demonstrate with appropriate arguments and evidence that the AP1000 design incorporates adequate engineered drainage facilities to enable anticipated EMIT activities to be carried out in a safe and controlled manner.</p> <p>With agreement from the Regulator this action may be</p>

	completed by alternative means.
RELEVANT REFERENCE DOCUMENTATION RELATED TO GDA ISSUE	
Technical Queries	TQ-AP1000-1062
Regulatory Observations	RO-AP1000-036
Other Documentation	Pipe Freezing for Maintenance Isolation Squib Valve Concept and Design Substantiation Step 4 - Mechanical Engineering Assessment of the Westinghouse AP1000 SAPs – EMT series; TAGs - Maintenance, Inspection & Testing SSCs

Scope of work:
<p>Westinghouse will provide a comprehensive review of the AP1000 system designs to either justify that the systems incorporate adequate isolation and drainage arrangements to enable all anticipated EMIT activities to be carried out in a safe and controlled manner or, where warranted, will propose alternative design solutions.</p> <p>This will include identifying the locations for the use of freeze seal technology and providing substantiating evidence or alternative solutions, identifying the locations of single valve isolation and providing justification that EMIT in the identified locations is ALARP or alternative solutions and identifying temporary drain locations and providing justification that the use of temporary drains for identified EMIT activities is ALARP or alternative solutions.</p>

Description of work:
<p>Westinghouse will be providing a separate document for each of the three GDA Issue actions as described below. The three documents will either provide sufficient arguments and evidence to justify that the use of freeze seal technology, the use of single valve isolation for identified EMIT activities and the use of temporary drain arrangements for identified EMIT activities are ALARP, or they will identify ALARP design solutions.</p> <p>Westinghouse will resolve the GDA Issue actions in the following three phases:</p> <ul style="list-style-type: none"> • Assessment of each freeze seal application. • Assessment of single valve EMIT isolations. • Assessment of pipe work drainage features.

Action A-1 – Assessment of each freeze seal application

Westinghouse will first identify and tabulate the planned location of each valve and respective freeze seal. For each identified location, Westinghouse will:

- Collect evidence and reasoning for use of freeze seals.
- Identify the likely frequency of freeze seal application.
- Confirm that the freeze seal location meets application criteria.
- Identify alternative isolation options.
- Define ALARP criteria including but not limited to:
 - Comparison with relevant good practice.
 - Implications of radiological protection on the proposed methods.
 - Implications to the plant integrity on the proposed methods.
 - Management and implications of radioactive waste associated with the proposed methods.
- Perform ALARP assessment for each freeze seal location.
- Summarise the ALARP justification for choice of freeze seals or conclude that there is an ALARP alternative design.

A document will be submitted to the ONR providing the above information. Once an agreement is reached with ONR on the ALARP assessment and the associated conclusions, Westinghouse will implement as appropriate.

Action A-2 – Assessment of single valve EMIT isolations

Westinghouse will first identify and tabulate each situation where EMIT will rely on single valve isolation. For each identified situation, Westinghouse will:

- Identify possible locations for adding an additional valve.
- Assess the benefit and risk of adding an additional valve.
- Identify the frequency of required isolation for EMIT.
- Define ALARP criteria for assessing each “single valve” location including but not limited to:

- Comparison with relevant good practice.
- Implications of radiological protection on the proposed methods.
- Management and implications of radioactive waste associated with the proposed methods.
- Perform ALARP assessment for each “single valve” location.
- Summarise the ALARP justification for not installing additional isolation valves or conclude that there is an ALARP alternative design.

A document will be submitted to the ONR providing the above information. Once an agreement is reached with ONR on the ALARP assessment and the associated conclusions, Westinghouse will implement as appropriate.

Action A-3 – Assessment of pipe work drainage features

Westinghouse will first identify all system drain locations and then tabulate the planned locations for temporary drain lines. For each identified location, Westinghouse will:

- Identify alternatives to temporary drains.
- Collect evidence and reasoning for use of temporary drains (temporary modifications).
- Identify the likely frequency of use of temporary drains.
- Define ALARP criteria for use of temporary drains including but not limited to:
 - Comparison with relevant good practice.
 - Implications of radiological protection on the proposed methods.
 - Implications to the plant integrity on the proposed methods.
 - Management and implications of radioactive waste associated with the proposed methods.
- Perform ALARP assessment for each drain.
- Summarise the ALARP justification for use of temporary drain or conclude that there is an ALARP alternative design.

A document will be submitted to the ONR providing the above information. Once an agreement is reached with ONR on the ALARP assessment and the associated

conclusions, Westinghouse will implement as appropriate.

Schedule/ programme milestones:

In addition to the GI-**AP1000**-ME-03 specific activities presented in the attached schedule/programme milestones, the topic will also be discussed and progressed during monthly KIT meetings between the ONR inspectors and Westinghouse licensing leads.

Because all Resolution Plan start dates are subject to future contract placements, dates are presently undefined; therefore schedule dates have been anonymised for consistency. Actual dates will be inserted when contracts are placed.

ID	Task Name	Duration	3rd Quarter			4th Quarter			1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			1st Quarter			2nd Quarter			3
			M-1	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	
1	Progress and Technical Review meeting	480 days																									
2	Meet with ONR accessors as needed	480 days																									
3	Issue Resolution Plan	479 days																									
4	ME.03 EMIT and Systems Isolation Arrangements	479 days																									
5	ME.03.A1 Justification of Pipe	202 days																									
6	ALARP Argument	106 days																									
12	ONR Review of submittal	20 days																									
13	WEC support of TQs	30 days																									
14	Preparation of Safety Submission Documentation	25 days																									
19	Issue draft to Regulator	1 day																									
20	Regulator to confirm response to action	20 days																									
21	Response received from ONR	0 days																									
22	ME.03.A2 ALARP Justification for EMIT with Single Valve I	187 days																									
23	ALARP Argument	91 days																									
29	ONR Review of submittal	20 days																									
30	WEC support of TQs	30 days																									
31	Preparation of Safety Submission Documentation	25 days																									
36	Issue draft to Regulator	1 day																									
37	Regulator to confirm response to action	20 days																									
38	Response received from ONR	0 days																									
39	ME.03.A3 Anticipated Drainage Facilities for EMIT	186 days																									
40	Anticipated Drainage Facilities for EMIT	85 days																									
46	ONR Review of submittal	20 days																									
47	WEC support of TQs	30 days																									
48	Preparation of Safety Submission Documentation	30 days																									
53	Issue draft to Regulator	1 day																									
54	Regulator to confirm response to action	20 days																									
55	Response received from ONR	0 days																									

Project: SI.03 Resolution Plan
Date: Wed 6/8/11

Task		Progress		Summary		External Tasks		Deadline	
Split		Milestone		Project Summary		External Milestone			

Methodology:
As listed in the Description of Work.

Justification of adequacy:
<p>The three documents that will be provided by Westinghouse will thoroughly cover the respective topics discussed above. The work will follow the general format of:</p> <ol style="list-style-type: none">1. Identification of the locations for freeze seal use, single valve isolation or the use of temporary drains.2. Collection of evidence and reasoning for the existing design solution.3. Definition of design alternatives.4. Definition of ALARP criteria.5. Completion of ALARP study to compare and contrast design options.6. Recommendation of design solution alternatives if appropriate. <p>ALARP arguments identifying and comparing alternatives will substantiate the AP1000 system designs related to isolation and drainage arrangements to enable all anticipated EMIT activities to be carried out in a safe and controlled manner or will provide arguments for proposed, alternative design solutions.</p>

Impact assessment:
<p>The following documents are anticipated to be effected:</p> <ul style="list-style-type: none">• Master Submission List• Roadmap