

Westinghouse UK
AP1000® GENERIC DESIGN ASSESSMENT
Resolution Plan for GI-AP1000-EE-01
PCSR Presentation of Claims, Arguments and Evidence

MAIN ASSESSMENT AREA	RELATED ASSESSMENT AREA(S)	RESOLUTION PLAN REVISION	GDA ISSUE REVISION
Electrical	-	2	0

GDA ISSUE:	<p>Westinghouse is required to produce, within the PCSR, the claims arguments and evidence to substantiate the design of the complete plant electrical distribution system. The claims made for the electrical system need to be related to the overall safety claims for the plant.</p> <p>Chapter 18 of the PCSR does not meet the above requirements to demonstrate the safety and integrity of the design of the electrical distribution system. Clear safety claims are not presented and there is no structure of arguments and evidence to substantiate the design.</p>
ACTION: GI-AP1000-EE-01.A1	<p>Westinghouse is required to produce a revised PCSR Chapter 18 to substantiate the design of the complete plant electrical distribution system. This needs to incorporate a structure of claims, arguments and evidence to demonstrate that the electrical system fully meets the requirements of its safety role as specified in the other chapters of the PCSR. ONR's expectations are that the PCSR should provide a rigorous justification for the completeness of the electrical power distribution system to perform its safety role. The current issue of Chapter 18 does not meet our regulatory expectations as follows:</p> <ul style="list-style-type: none"> • The PCSR does not provide a clear justification of the safety of the AP1000® electrical distribution system. References to other sections of the PCSR do not provide any detail to relate to the overall plant safety claims. • There is no clear structure of claims, arguments and evidence and it is difficult to determine what the actual safety claims are due to a considerable degree of ambiguity. • The electrical chapter of the PCSR principally addresses the reactor; the cooling ponds are not adequately covered. • The description of each constituent part of the electrical system has been presented as a Safety Assessment Principles (SAP) compliance document. The PCSR needs to consider the complete system and

	<p>needs to substantiate this design rather than only addressing SAP compliance.</p> <p>With agreement from the Regulator this action may be completed by alternative means.</p>
RELEVANT REFERENCE DOCUMENTATION RELATED TO GDA ISSUE	
Technical Queries	
Regulatory Observations	RO-AP1000-077
Other Documentation	<ul style="list-style-type: none"> • UKP-GW-GL-793, Rev. 0, “AP1000 Pre-Construction Safety Report”, March 2011 • UKP-GW-GL-065, Rev. 1 “UK AP1000 Electrical Equipment Maintenance”, December 2010

Scope of work:
<p>ONR requests that Chapter 18 (Electrical Power Systems) of the AP1000 Pre-Construction Safety Report (PCSR) be revised to better substantiate the safety and integrity of the AP1000 electrical distribution system design. Specifically, ONR has reported that the PCSR does not provide clear safety claims and there is no structure to the arguments and evidence to substantiate the design. In addition to the GDA Issue, Westinghouse and ONR had more detailed discussions about the PCSR during GDA Level 4 meetings.</p>

Description of work:
<p>Technical discussions in the Electrical Assessment area were held during GDA Level 4 meetings between Westinghouse and ONR on 11 – 12 January 2011 and on 4 – 5 May 2011. It was agreed at these meetings that Westinghouse will revise Chapter 18 of the PCSR (Electrical Power Systems) based on observations provided by ONR at these meetings. High level observations on Chapter 18 of the PCSR are as follows:</p> <ol style="list-style-type: none"> 1. The PCSR Electrical chapter does not provide a clear justification for the safety case for the AP1000 electrical system. A greater level of detail is expected by ONR. 2. The structure of claims, arguments and evidence in the PCSR electrical chapter is not clear. 3. Electrical support for the systems used for spent fuel pool cooling is not adequately covered. The PCSR will need to be revised to substantiate the reliability claims of the active cooling systems. 4. The ability to perform maintenance of the electrical equipment is not adequately covered. A greater level of detail is expected by ONR concerning the ability of certain pieces of electrical equipment to be taken out of service for maintenance during operations at power as well as during shutdown periods. Considerations will centre around the power requirements needed for operations, refueling, core offloads and maintaining spent fuel cooling. This will require revision of the UK AP1000 Electrical Equipment Maintenance document (UKP-GW-GL-065) as well as the PCSR. 5. The requirements of the battery systems in relation to safe reactor shutdown is not clear.

PSA input will be required to substantiate the PCSR claims, in particular those associated with electrical equipment maintenance and electrical support for spent fuel pool cooling. Westinghouse PSA engineers will work with the appropriate systems and equipment engineers to ensure that the appropriate PSA input is included. The PSA input will include risk importance factors from taking equipment out of service for maintenance.

Resolution of other GDA Issues in other technical areas will affect the input to the electrical safety case and this resolution plan. Specifically, the resolution of the following GDA Issues are anticipated to provide input to the electrical safety case:

- GI-**AP1000**-FS-01 (Spent Fuel Pool Safety Case)
- GI-**AP1000**-C&I-01 (DAS - Adequacy of Safety Case)
- GI-**AP1000**-C&I-02 (DAS – Adequacy of Architecture)
- GI-**AP1000**-C&I-05 (SMART Devices – Justification for Use)

To be clear, this resolution plan does not cover resolution of these other GDA Issues, but acknowledges that their resolution will affect input to the electrical safety case.

The deliverables to ONR to resolve this GDA Issue are as follows:

- Outline of the revised PCSR electrical chapter including a table of contents showing the higher level section titles, a listing of the electrical claims and how they will be supported, examples of how the structure of the final document will look, format of the final document, etc.
- List of references that will go into the completed PCSR electrical chapter
- Outline of the Electrical support of SFP Cooling to be placed in the revised PCSR electrical chapter
- Revised Electrical support of SFP Cooling discussion in the PCSR electrical chapter consistent with the resolution of GI-**AP1000**-FS-01
- Philosophy of what information will go into the Maintenance Document
- Revised UK **AP1000** Electrical Equipment Maintenance document (UKP-GW-GL-065)
- Revised discussion in the PCSR electrical chapter about the required minimum electrical equipment availability to support for maintenance activities consistent with the revised UK **AP1000** Electrical Equipment Maintenance document
- Revised battery discussion in the PCSR electrical chapter providing a more accurate discussion of the batteries role in shutting down the plant
- Revised DAS discussion substantiating the Electrical support of DAS consistent with the resolution of GI-**AP1000**-C&I-01 and GI-**AP1000**-C&I-02
- Revised Software Verification and Validation of software supporting electrical equipment consistent with the resolution of GI-**AP1000**-C&I-05
- Revised agreed draft of the PCSR electrical chapter

Each of the above deliverables will require interim reviews and discussions with ONR and documented agreement, where appropriate.

Schedule/ programme milestones:

To be completed when detailed resolution plan is agreed. The programme milestones will be the draft documents, Westinghouse/ONR meetings/teleconferences and documented agreement of the deliverables:

- Outline of the revised PCSR electrical chapter including a table of contents showing the higher level section titles, a listing of the electrical claims and how they will be supported, examples of how the structure of the final document will look, format of the final document, etc.
- List of references that will go into the completed PCSR electrical chapter
- Outline of the Electrical support of SFP Cooling to be placed in the revised PCSR electrical chapter
- Revised Electrical support of SFP Cooling discussion in the PCSR electrical chapter consistent with the resolution of GI-**AP1000**-FS-01
- Philosophy of what information will go into the Maintenance Document
- Revised UK **AP1000** Electrical Equipment Maintenance document (UKP-GW-GL-065)
- Revised discussion in the PCSR electrical chapter about the required minimum electrical equipment availability to support for maintenance activities consistent with the revised UK **AP1000** Electrical Equipment Maintenance document
- Revised battery discussion in the PCSR electrical chapter providing a more accurate discussion of the batteries role in shutting down the plant
- Revised DAS discussion substantiating the Electrical support of DAS consistent with the resolution of GI-**AP1000**-C&I-01 and GI-**AP1000**-C&I-02
- Revised Software Verification and Validation of software supporting electrical equipment consistent with the resolution of GI-**AP1000**-C&I-05
- Revised agreed draft of Chapter 18 of the PCSR electrical chapter

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 Qu
			M-1	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18
1	Progress and Technical Review meeting	386 days	[Progress bar]																		
2	Meet with ONR as needed	386 days	[Progress bar]																		
3	Issue Resolution Plan	386 days	[Summary bar]																		
4	EE.01 PCSR Presentation of Claims, Arguments and Evidence	330 days	[Summary bar]																		
5	Outline of PCSR-Chapter 18	77 days	[Summary bar]																		
6	Kick Off Meeting	1 day	[Milestone]																		
7	Outline of Chapter 18	60 days	[Summary bar]																		
14	Presentation of Outline PCSR Chapter 18 to ONR	1 day	[Milestone]																		
15	Progress Telecon with ONR	1 day	[Milestone]																		
16	Progress Telecon with ONR	1 day	[Milestone]																		
17	ONR Review of submittal	10 days	[Milestone]																		
18	Teleconference to Review ONR Comments	5 days	[Milestone]																		
19	Confirmation of Solution	0 days	[Milestone]																		
20	Review/Update PCSR Chapter 18	253 days	[Summary bar]																		
21	Ongoing Update of PCSR Chapter 18	253 days	[Progress bar]																		
22	Monthly Reviews of PCSR Chapter 18	216 days	[Summary bar]																		
23	PCSR Monthly Presentation	1 day	[Milestone]																		
24	PCSR Monthly Presentation	1 day	[Milestone]																		
25	PCSR Monthly Presentation	1 day	[Milestone]																		
26	PCSR Monthly Presentation	1 day	[Milestone]																		
27	PCSR Monthly Presentation	1 day	[Milestone]																		
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30	PCSR Monthly Presentation	1 day	[Milestone]																		
31	PCSR Monthly Presentation	1 day	[Milestone]																		
32	PCSR Monthly Presentation	1 day	[Milestone]																		
33	PCSR Monthly Presentation	1 day	[Milestone]																		
34	WEC Revise Maintenance Philosophy Document	179 days	[Summary bar]																		
35	Philosophy	11 days	[Summary bar]																		
38	ONR Review of submittal	10 days	[Milestone]																		
39	Teleconference to Review ONR Comments	5 days	[Milestone]																		
40	Confirmation of Solution	0 days	[Milestone]																		
41	Documentation (UKP-GW-GL-065)	79 days	[Summary bar]																		
49	ONR Review of submittal	10 days	[Milestone]																		
50	Teleconference to Review ONR Comments	5 days	[Milestone]																		
51	Confirmation of Solution	0 days	[Milestone]																		
52	Documentation-Update PCSR Section	44 days	[Summary bar]																		
57	ONR Review of submittal	10 days	[Milestone]																		
58	Teleconference to Review ONR Comments	5 days	[Milestone]																		
59	Confirmation of Solution	0 days	[Milestone]																		
60	Electrical Support of SFP Cooling	125 days	[Summary bar]																		
61	Outline of Electrical Support of SPF Cooling	51 days	[Summary bar]																		
68	ONR Review of submittal	10 days	[Milestone]																		
69	Teleconference to Review ONR Comments	5 days	[Milestone]																		

Project: Simple Resolution Plan
Date: Thu 6/9/11

Task: [Progress bar] Progress, [Split bar] Split
Milestone: [Diamond] Milestone
Summary: [Thick bar] Summary, [Thin bar] Project Summary
External Tasks: [Arrow bar] External Tasks, [Diamond bar] External Milestone
Deadline: [Green arrow] Deadline

ID	Task Name	Duration	3rd Quarter			4th Quarter			1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			1st Qu	
			M-1	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19
70	Confirmation of Solution	0 days																				
71	Documentation-Update PCSR Section	44 days																				
76	ONR Review of submital	10 days																				
77	Teleconference to Review ONR Comments	5 days																				
78	Confirmation of Solution	0 days																				
79	WEC Revise Battery Discussion	59 days																				
80	Battery Discussion-Draft	24 days																				
85	ONR Review of submital	10 days																				
86	Teleconference to Review ONR Comments	5 days																				
87	Confirmation of Solution	0 days																				
88	Documentation-Update PCSR Section	20 days																				
92	WEC Revise DAS Discussion	79 days																				
93	Substantiate Electrical Support of DAS-Draft	44 days																				
99	ONR Review of submital	10 days																				
100	Teleconference to Review ONR Comments	5 days																				
101	Confirmation of Solution	0 days																				
102	Documentation-Update PCSR Section	20 days																				
106	WEC Revise V&V for Software Support of Electrical Equip.	79 days																				
107	Verification and Validation for Software Supporting Electrical Equip.-Draft	44 days																				
113	ONR Review of submital	10 days																				
114	Teleconference to Review ONR Comments	5 days																				
115	Confirmation of Solution	0 days																				
116	Documentation-Update PCSR Section	20 days																				
120	List of References-Chapter 18 PCSR	36 days																				
121	List of References-Draft	21 days																				
126	ONR Review of submital	10 days																				
127	Teleconference to Review ONR Comments	5 days																				
128	Confirmation of Solution	0 days																				
129	Confirmation of Solution EE.01	0 days																				
130	Preparation of Safety Submission Documentation	35 days																				
135	Issue draft Chapter 18 to Regulator	1 day																				
136	Regulator to confirm response to action	20 days																				
137	Response received from ONR	0 days																				

Project: Simple Resolution Plan
Date: Thu 6/9/11

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

Methodology:

Revised documents will be drafted and reviewed with ONR. Once agreement is established between Westinghouse and ONR for the deliverables documentation of the agreement will be provided.

Justification of adequacy:

The process for resolution of this GDA Issue includes deliverables and milestones agreed between Westinghouse and ONR.

Impact assessment:

The PCSR electrical chapter (Chapter 18) and the UK **AP1000** Electrical Equipment Maintenance document (UKP-GW-GL-065) will be revised to reflect the outcome of this GDA issue resolution.