

Westinghouse UK
AP1000® GENERIC DESIGN ASSESSMENT
Resolution Plan for GI-AP1000-SI-03
Reactor Coolant Pump

MAIN ASSESSMENT AREA	RELATED ASSESSMENT AREA(S)	RESOLUTION PLAN REVISION	GDA ISSUE REVISION
Structural Integrity	-	3	0

GDA ISSUE:	Reactor Coolant Pump – Pump Bowl Integrity Case and Flywheel Disintegration Case.
ACTION: GI-AP1000-SI-03.A1	<p>Supply a technical report addressing the structural integrity considerations related to a clad ferritic pump bowl casing and support the assessment of the pump bowl integrity case.</p> <p>Activities by Westinghouse should comprise:</p> <ul style="list-style-type: none"> • Provide a report on the structural integrity considerations related to clad ferritic casing material which includes consideration of: <ul style="list-style-type: none"> ○ Pump casing design, ○ Material specification (Chemical composition and mechanical properties), ○ Forging manufacturing process, ○ Pump Casing fabrication, ○ Weld geometry, process and procedures for safe end weld to pipework and attachment weld for steam generator, ○ Clad process including process, specification and inspections. ○ ASME analyses of the design. • Provide adequate responses to any questions arising from the assessment by ONR of the pump bowl integrity case. <p>With agreement from the Regulator this action may be completed by alternative means.</p>
ACTION: GI-AP1000-SI-03.A2	<p>Support the ongoing assessment of the Flywheel Disintegration Case</p> <p>Activities by Westinghouse should comprise:</p> <ul style="list-style-type: none"> • Provide adequate responses to any questions arising from assessment by ONR of documents submitted. <p>With agreement from the Regulator this action may be completed by alternative means.</p>
RELEVANT REFERENCE DOCUMENTATION RELATED TO GDA ISSUE	
Technical Queries	None
Regulatory Observations	None

Other Documentation	UKP-GW-GL-793 Rev. 0 Chapter 20 UKP-GW-GLR-013, Rev. A: eRoom Row 012971; KSB Documentation: eRoom Rows 000970-000974, 000988- 001006, 011191-011198 EPS-MP01-M2-001, Rev. C
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Scope of work:
<p>The key activities which will need to be completed to close this GDA Issue are:</p> <ul style="list-style-type: none"> • Supply a technical report addressing the structural integrity considerations related to a clad ferritic pump bowl casing. The technical report is provided as Appendix F of Chapter 20 of the PCSR. The appendix has been updated to reflect all recent design changes. This update was included in Revision 0 of the PCSR, which was submitted in March 2011. • Support the ongoing assessment of the Pump Bowl Integrity Case and the Flywheel Disintegration Case through timely response to regulatory inquiries.

Description of work:
<p>The primary document to assess will be Appendix 20F of UKP-GW-GL-793 and supporting documentation such as the reactor coolant pump design specification and the ASME analysis. A large portion of the work to support this issue will involve providing responses to queries that arise from ONR's review. The GDA Issue Action 1 contains seven items which should be considered for the report. The seven items along with a brief summary of how they are addressed in the report is provided below:</p> <ul style="list-style-type: none"> • Pump casing design: Appendix 20F of the PCSR provides the component safety report (CSR) for the reactor coolant pump. The CSR and its supporting documentation such as the pump design specification, design review packages, and KSB design analysis justify the pump casing design. • Material specification: Section 20F.3.1.2 of the PCSR provides an overview of the material specification for the pressure boundary materials for the RCP. Additional supporting information and requirements are defined in Section 5.0 of the Reactor Coolant Pump Design Specification, which is referenced in the component safety report. • Forging manufacturing process: The pump casing is a one-piece forged component. The forging is required to be manufactured in accordance with the Codes and Standards identified in Section 2 of the design specification (EPS-MP01-M2-001). The specific details related to manufacturing process will be determined once a vendor is selected. • Pump casing fabrication: All Class 1 components of the RCP shall be fabricated per the requirements of the ASME B&PV Code, Section III, Subsection NB, Article NB-4000. Section 20F.3.1.1 of the PCSR provides an overview of the pump fabrication requirements. Additional supporting information and requirements are defined in Section 7.0 of the Reactor Coolant Pump Design Specification. Additional supplemental fabrication and inspection requirements, beyond what is required by the ASME code, are defined in APP-GW-VLR-010.

- Weld geometry, process and procedures for safe end weld to pipework and attachment weld for the steam generator: As identified in Section 20F.1.5 of the PCSR, the pump weld to the steam generator is considered to be part of the steam generator and the weld to the cold leg piping is considered as part of the piping. The weld to the steam generator has been identified as a HSS weld and is described in the steam generator CSR in section 20C.1.4.1.1 of the PCSR.
- Clad process: The RCP casing has an austenitic cladding of the wetted surfaces. Cladding and subsequent examinations will be conducted in accordance with the applicable codes and standards identified in the pump design specification. The specific details related to cladding process will be determined once a vendor is selected.
- ASME analysis: The RCP pressure boundary stress analysis and the ASME sizing calculations are described in Section 20F.3.2 of the PCSR. The supporting KSB analysis for the RCP has been supplied to ONR. As a requirement of the design specification, the pump supplier will be required to provide a final ASME Design Report.

GDA Issue Action 2: Westinghouse will support the ongoing assessment of the Pump Bowl Integrity Case and the Flywheel Disintegration Case through timely response to regulatory inquiries.

Schedule/ programme milestones:

Please see the following page for the schedule.

Activity Name	2015										2016										
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
UK Generic Design Assessment (GDA) Resolution Plans (51)																					
STRUCTURAL INTEGRITY																					
SI.03 Reactor Coolant Pump-Resolution Plan																					
SI.03 Casing Structural Integrity Report (A1)																					
Casing Structural Integrity Report - Submit to ONR																					
Casing Structural Integrity Report - ONR Review of Submittal																					
SI.03 Flywheel Disintegration (A2)																					
WEC Address ONR Queries on Flywheel Disintegration Case																					

Methodology:
Not applicable.

Justification of adequacy:
<p>Timely closure of the actions defined in this Issue will be reached through maintaining quality interaction with ONR and using existing processes to assure closure of open items.</p> <p>Appendix 20F of the PCSR provides the component safety report for the AP1000[®] reactor coolant pump for the UK. The component safety report was developed based on a standard approach that has been used for each of the Standard Class 1 components that have been reviewed as part of the AP1000 structural integrity assessment in the UK. The report and its supporting documentation addresses the following items that were identified in the draft GDA Issue:</p> <ol style="list-style-type: none">1. Pump casing design,2. Material specification (Chemistry)3. Safe ends4. SG attachment welds, geometry, process (the welds to the SG are included as part of the SG component safety report)5. ASME analyses <p>The draft GDA Issue also request information on the manufacturing process. This includes information related to the forging, pump casing fabrication, and cladding process. Requirements related to manufacturing and fabrication are provided within the pump design specification. Specific details related to manufacturing may vary based on the vendor. Westinghouse will work with ONR to provide additional information as requested; however, some information may not be available because specific vendors have not been selected.</p>

Impact assessment:
<p>The primary safety submission document potentially affected by this Issue is the PCSR. Based on review of the reactor coolant pump component safety report, it may be necessary to update Appendix 20F to reflect regulatory inquiries arising during this assessment.</p>