

## EDF AND AREVA UK EPR GENERIC DESIGN ASSESSMENT

### GDA ISSUE

#### CATEGORISATION AND CLASSIFICATION OF SYSTEMS STRUCTURES & COMPONENTS

#### GI-UKEPR-CC-01 REVISION 1

<b>Technical Area</b>		<b>CROSS CUTTING</b>	
<b>Related Technical Areas</b>		<b>All</b>	
<b>GDA Issue Reference</b>	<b>GI-UKEPR-CC-01</b>	<b>GDA Issue Action Reference</b>	<b>GI-UKEPR-CC-01.A1</b>
<b>GDA Issue</b>	The RP to demonstrate that the methodology developed and applied for categorising Safety Function and classifying Structures, Systems and Components is in line with UK and international standards and relevant good practice.		
<b>GDA Issue Action</b>	<p>EDF and AREVA to review all the PCC-2 to PCC-4 initiating events and identify any safety related systems (SRS) that require safety classification, or an alternative safety classification to that presented in report NEPS-F DC 557 C.</p> <p>It is expected that SRSs whose failure results in a PCC-3 or PCC-4 event will already have a safety classification commensurate with the assumptions made in the initiating event frequency. Some PCC-2 events may be the result of failures in non-classified duty / operational systems. This may be appropriate but EDF and AREVA need to demonstrate that there are no implicit claims made on integrity or the design that need to be captured by an appropriate safety classification.</p> <p>The evidence we expect to see to address this action includes:</p> <ul style="list-style-type: none"> <li>• A systematic identification of the SSCs whose failure can lead to a PCC event.</li> <li>• A clear identification of, or reference to, the current safety classification and design requirements applied to those SSCs.</li> <li>• Discussion on how this safety classification is commensurate with the PCC allocation and safety criteria applied.</li> <li>• A revision of report NEPS-F DC 557 C to expand or modify the list of safety classified SSCs.</li> </ul> <p>With agreement from the Regulators this action may be completed by alternative means.</p>		

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<b>GDA Issue Action</b>	<p>The responses to GDA TQ's on the classification of internal structures within buildings to be added into an update to the GDA PCSR.</p> <p>Further clarification is required from EDF and AREVA on what is meant by "dedicated rules" in report N°NEPS-F DC 557 Rev C and in the PCSR, for the design of C2 structures. The evidence we expect to see to address this action is:</p> <ul style="list-style-type: none"> <li>To update GDA PCSR chapter 3.2 to include the responses to GDA TQ's on the classification of internal structures.</li> <li>To update PCSR chapter 3.3 in order to detail "dedicated rules" for the design of C2 structures and their scope of application.</li> </ul> <p>With agreement from the Regulator this action may be completed by alternative means.</p>		

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<b>GDA Issue Action</b>	<p>EDF and AREVA to update fault schedule in report N°NEPS-F DC 557 Rev C to include credible external and internal hazards as initiating events and from that the safety functions and SSC classifications.</p> <p>The evidence we expect to see to address this action is:</p> <ul style="list-style-type: none"> <li>• Update fault schedule in report N°NEPS-F DC 557 CCI to include credible external and internal hazards as initiating events</li> <li>• Derive from the updated fault schedule the safety functions and SSC classifications</li> <li>• Update PCSR to align with update to report N°NEPS-F DC 557 CCI.</li> </ul> <p>With agreement from the Regulator this action may be completed by alternative means.</p>		

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<b>GDA Issue Action</b>	<p>EDF and AREVA to provide evidence that demonstrates the applicability of the M1-M3 classification approach against ONR's expectations as detailed within SAPs, particularly ECS.3 and supporting paragraphs 157-161. In particular EDF and AREVA need to fully justify each case where an M3 requirement is applied to a Class 1 system i.e. an expansion of the claims made in Table 14 of NEPS-F DC 557 Rev C to show the arguments and evidence to support use of M3 for each Class 1 system. The arguments and evidence should take account of; the safety significance of the SSC, the demands that are placed on the system in terms of loadings, fatigue, temperature etc. and the consequences of the failure of the pressure boundary in terms of both the loss of system function and on the Internal Hazards safety case.</p> <p>Where non-nuclear pressure vessel codes e.g. European Harmonised Standards are intended to be used in the design of Class 2 systems EDF and AREVA need to fully justify each case i.e. an expansion of the claims made in Table 14 of NEPS-F DC 557 Rev C to show the arguments and evidence to support use of non-nuclear pressure vessel codes for each Class 2 system. The arguments and evidence should take account of; the safety significance of the SSC, the demands that are placed on the system in terms of loadings, fatigue, temperature etc. and the consequences of the failure of the pressure boundary in terms of both the loss of system function and on the Internal Hazards safety case.</p> <p>With agreement from the Regulator this action may be completed by alternative means.</p>		

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<b>GDA Issue Action</b>	<p>EDF and AREVA to provide evidence to justify the allocation of class 3 SSC as the diverse line of protection for frequent faults and a demonstration that such allocation is ALARP.</p> <p>The evidence we expect to see to address this action is:</p> <ul style="list-style-type: none"> <li>Detailed analysis of the seismic behaviour and ALARP justifications for electrical components</li> <li>Details on C&amp;I class allocation</li> </ul> <p>With agreement from the Regulator this action may be completed by alternative means.</p>		

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<b>GDA Issue Action</b>	<p>Categorisation of C&amp;I systems to be consistent with current good practice as provided by IEC61226:2009 Nuclear Power Plants – Instrumentation and Control Systems Important to Safety – Classification’.</p> <p>The evidence we expect to see to address this action is:</p> <ul style="list-style-type: none"> <li>• Evidence to demonstrate that the categorisation of C&amp;I systems is consistent with current good practice provided by IEC61226:2009 Nuclear Power Plants – Instrumentation and Control Systems Important to Safety – Classification.</li> <li>• Evidence to demonstrate that the categorisation of C&amp;I systems is consistent with the probabilistic claims (derived fro HSE ND TAG 46 ) given below.</li> </ul> <p>With agreement from the Regulator this action may be completed by alternative means.</p>		

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<b>GDA Issue Action</b>	<p>EDF and AREVA to provide evidence to justify the allocation of Class 2 SSCs to cool the spent fuel pool and demonstrate that the current allocation is ALARP. EDF and AREVA have claimed that the spent fuel pool is in a controlled state at the start of a loss of cooling event because of the available grace times before significantly elevated temperatures are reached. As a result, it is argued that provision of cooling to remove decay heat from the spent fuel pool is a Category B function, only requiring the main cooling trains to be Class 2. However this allocation means that there are no Class 1 SSCs providing this vital safety function.</p> <p>The references, Classification of Structures Systems and Components. NEPS-F DC 557 Revision C, and 2. Dossier de Système Élémentaire PTR, P2 – Fonctionnement du système [System Design Manual Spent Fuel Cooling and Purification System (PTR [FPPS/FPCS]), P2 – System operation], set out the design requirements for the spent fuel pool cooling system, including the safety classification. The piping and heat exchangers are built to class M2 (the highest standard that is applied to SSCs not part of the reactor coolant pressure boundary or in the “High Integrity Component” (HIC) envelope). The main cooling trains are also to be built to the highest seismic and electrical standards. Therefore, many aspects of the design would be unaltered by reclassification. One potential shortfall is C&amp;I where there are identifiable differences in requirements between Class 1 and Class 2 SSCs. Another concern is that while the piping is not part of the HIC envelope, the UKEPR PCSR claims “break preclusion” for the M2 piping upstream of isolation valves. EDF and AREVA shall review the safety classification of SSCs claimed to deliver spent fuel pool cooling functions and demonstrate that the current allocation is ALARP. The evidence we expect to see to address this action includes:</p> <ul style="list-style-type: none"> <li>Detailed analysis of the seismic, mechanical, electrical and structural integrity requirements of spent fuel pool cooling systems.</li> </ul>		

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	<ul style="list-style-type: none"><li>Detailed analysis of the C&amp;I class allocation.</li></ul> With agreement from the Regulator this action may be completed by alternative means.		



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<b>GDA Issue Action</b>	<p>EDF and AREVA to provide further clarification with regards to differentiation elements for Class 1, 2, and 3 electrical systems both in terms of systems architecture and electrical components design and to provide evidence that the difference between EE1 and EE2 systems is much broader than seismic requirements (system architecture, single failure criterion, component integrity, diversity, equipment qualification etc.) The evidence we expect to see to address this action is:</p> <ul style="list-style-type: none"> <li>Revision to report NEPS-F DC 557 Rev C to provide further clarification to define class 1, 2, and 3 electrical SSCS and differentiation elements for these systems both in terms of systems architecture and electrical components design.</li> </ul> <p>With agreement from the Regulator this action may be completed by alternative means.</p>		