

## WESTINGHOUSE AP1000® GENERIC DESIGN ASSESSMENT

### GDA ISSUE

### DAS – ADEQUACY OF ARCHITECTURE

### GI-AP1000-CI-02 REVISION 0

<b>Technical Area</b>		<b>CONTROL AND INSTRUMENTATION</b>	
<b>Related Technical Areas</b>		None	
<b>GDA Issue Reference</b>	<b>GI-AP1000-CI-02</b>	<b>GDA Issue Action Reference</b>	<b>GI-AP1000-CI-02.A1</b>
<b>GDA Issue</b>	<p>ONR sought clarity regarding the adequacy of the DAS (the secondary protection system) 2 out of 2 operating philosophy. In response Westinghouse has proposed significant changes to the architecture of the DAS (i.e. from a 2 channel 2oo2 voted system to a system whose logic is a combination of 2oo3 or 1oo2 twice voting).</p> <p>The expectation is that this modified architecture will allow the DAS to remain in service during power operation but this needs to be substantiated as the detailed design and reliability analyses are completed. The substantiation should also demonstrate that both the automatic and manual DAS can achieve their declared reliability targets.</p> <p>For further guidance, see T16.TO1.04 and T16.TO2.17 in Annex 6 of C&amp;I Assessment Report No. 11/006 (draft).</p>		
<b>GDA Issue Action</b>	<p>Provide a substantiation that the automatic DAS remains in service during reactor power operation including meeting the requirements for maintenance and proof testing.</p> <p>The DAS forms part of the reactor protection system and Westinghouse had identified that the DAS would be a two channel system requiring a 2oo2 vote and positive actuation to trip. The DAS automatic trip function would not be available during reactor operation when test and maintenance activities are undertaken as the channel is in bypass and the 2oo2 logic retained. The DAS Engineered Safeguard Features (ESF) manual controls would also be powered down during reactor power operation.</p> <p>ONR identified that this architecture and mode of system operation appeared contrary to a number of the SAPs associated with protection systems, e.g. ESS 21 &amp; EDR 1, and ESS 23 for maintenance, and for systems providing the ESF, e.g. ESS 8 &amp; 9 and ERL 3. Westinghouse has proposed, a change to the DAS architecture changing the required automatic logic from 2oo2 logic to a combination of 2oo3 and 1oo2 twice logic. ONR has reviewed the change proposal noting that it in principle addresses the concerns raised and has provided comments to Westinghouse to this effect.</p> <p>Note: The revised DAS has to be formally introduced, its design completed, see GI-AP1000-CI-01.A1 &amp; A2, to allow the necessary analysis to be completed to substantiate that the DAS is available at all times during power operation. The substantiation should be included in the basis of safety case for the DAS.</p> <p>With agreement from the Regulator this action may be completed by alternative means.</p>		

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<b>Related Technical Areas</b>		None	
<b>GDA Issue Reference</b>	<b>GI-AP1000-CI-02</b>	<b>GDA Issue Action Reference</b>	<b>GI-AP1000-CI-02.A2</b>
<b>GDA Issue Action</b>	Provide a substantiation that the automatic and the manual DAS meets their reliability targets. The revised DAS has to be formally introduced, its design completed, see GI-AP1000-CI-01.A1 & A2, to allow the necessary analysis to be completed to substantiate that both the automatic and manual parts of the DAS meet their reliability targets. Note: the substantiation should be included in the basis of safety case for the DAS. With agreement from the Regulator this action may be completed by alternative means.		

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<b>Technical Area</b>		<b>CONTROL AND INSTRUMENTATION</b>	
<b>Related Technical Areas</b>		ELECTRICAL	
<b>GDA Issue Reference</b>	<b>GI-AP1000-CI-02</b>	<b>GDA Issue Action Reference</b>	<b>GI-AP1000-CI-02.A3</b>
<b>GDA Issue Action</b>	<p>Identify and provide a description of the sources of electric power for the DAS and their physical location on the plant.</p> <p>This should include the safety class of the supply, the source of supply including the division providing the supply, supply voltage and capacity, and loads supplied. For battery backed supplies the battery operating time is also required.</p> <p>For the DAS dedicated battery supplies the location of the equipment (batteries and chargers) is required along with their safety class, loads supplied and battery operating time. The primary source of power should be described as part of the response above.</p> <p>Other sources of power required by the DAS to operate should be described, for example for firing the squib valves or hydrogen igniters. The details required are as indicated above.</p> <p>The descriptions should be supported by a substantiation of the adequacy of the supplies including their qualification, capacity and a demonstration that supply performance is consistent with the reliability claims on and the availability / endurance of the DAS.</p> <p>Note: the description and substantiation of the adequacy of the supplies should be included in the basis of safety case for the DAS.</p> <p>With agreement from the Regulator this action may be completed by alternative means.</p>		