

EDF AND AREVA UK EPR GENERIC DESIGN ASSESSMENT

GDA ISSUE

HETEROGENEOUS BORON DILUTION SAFETY CASE

GI-UKEPR-FS-01 REVISION 0

Technical Area		FAULT STUDIES	
Related Technical Areas		Probabilistic Safety Assessment Reactor Chemistry	
GDA Issue Reference	GI-UKEPR-FS-01	GDA Issue Action Reference	GI-UKEPR-FS-01.A1
GDA Issue	A safety case for heterogeneous boron dilution events is required. Both external dilution events and intrinsic dilution mechanisms from certain accident situations need to be addressed.		
GDA Issue Action	<p>EDF and AREVA to provide ONR with a safety case for heterogeneous boron dilution faults. This needs to consider both external and intrinsic faults.</p> <p>ONR's expectation is that faults are identified as being within the design basis based on their initiating frequency and their unmitigated consequences. Arguments that heterogeneous boron dilution faults are practically eliminated and do not need a full design basis analysis treatment due to probabilistic arguments taking benefit for engineered safety measures are unlikely to be accepted.</p> <p>CFD analysis is a developing methodology, which offers insights into complex scenarios like heterogeneous boron dilution faults. However it can be sensitive to many variables, for example the skill of the practitioner, fine details of the model, the assumed boundary conditions etc. Validation of the CFD model is both important and difficult. ONR therefore encourages EDF and AREVA not to provide a safety case heavily reliant on claims derived directly from CFD analysis.</p> <p>ONR's assessment of the heterogeneous boron dilution safety case will inevitably generate questions and request further evidence. EDF and AREVA shall respond to ONR's queries on the supplied safety case and provide further evidence, especially related to:</p> <ul style="list-style-type: none"> • EDF and AREVA are claiming that the size of any un-borated slug of water will be limited by safety classified boron meters. EDF and AREVA need to provide evidence that these devices are capable of delivering this function to the requisite reliability. • For those faults where the size of an un-borated slug is restricted by other means, for example following a steam generator tube plugging error, EDF and AREVA also need to provide evidence they too are capable of delivering this function to the requisite reliability. A heavy reliance on administrative controls is likely to be subject to scrutiny by ONR. • For dilution events resulting from intrinsic mechanisms, EDF and AREVA will need to provide evidence of adequate validation for any CFD derived claims used as part of a multi-legged safety case. 		

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	EDF and AREVA shall update the PCSR in accordance with the agreed safety case. With agreement from the Regulator this action may be completed by alternative means.		