

DS494 - Protection against Internal Hazards in the Design of Nuclear Power Plants

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: P. De Gelder Page 1 of 1 Country/Organization: Belgium/Bel V Date: 17/09/2015							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	§ 7 (list of hazards)	Replace “Mechanical effects of pipe breaks” by “Effects of pipe breaks (pipe whip, jet impact, ...)	Considering only the mechanical aspects might be too limitative. Also jet impact effects should be considered.	Yes	Jet impact is a mechanical effect and it will be included. If we remove “mechanical” others would question if flooding is included there? Flooding is listed separately and can be also the result of human errors for instance, not necessarily a pipe break. I propose physical or secondary effects instead of mechanical. The primary effect would be flooding.		

--	--	--	--	--	--	--	--

COMMENTS BY REVIEWER				RESOLUTION			
Country/Organization: Canadian Industry			Date: Oct. 2, 2015	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	3.	Important to ensure that the Guide is prepared to align with the issued version of SSR 2/1. It is suggested to confirm the acceptance / publication of Revision 1 SSR 2/1 prior to using it as the basis.	Request for clarification.	Clarification	SSR 2/1 Rev.1 has been approved by the IAEA BoG. It will be the basis for the SG. Editorial changes before printing cannot change the meaning of the requirements.		
2	5.	Need clarification on when additional design safety features are assessed for internal hazards and to what rigour i.e. can they be screened out?	Request for clarification.	Clarification	<p>The comment is not clear. If it relates to safety features for DEC, they are items important to safety that are used in accident conditions beyond DBA. They need to be protected against internal hazards. It is required in SSR 2/1 This is a DPP, not the place to discuss this subject. This will be addressed in the SG. In any case, only some hazards will be screened out for establishing protections in the areas where such safety features are located, if the hazard is not possible (e.g. no flooding possible, no drop of heavy load possible, etc.)</p> <p>The safety features for DEC need to be protected in the same manner as the safety systems (SSR 2/1 requires also more margins against hazards for DEC). They may not be redundant, therefore it is possible that for instance a fire in one area where the DEC equipment is located will damage it, but the design should ensure the independence of safety systems and safety features for DE regarding internal hazards. Hence, the hazard should not affect safety systems and associated safety features for DEC at once.</p>		
3	5.	Suggest those scenarios to be included or provide cross-reference details to the other documents where the design guidance to protect against these scenarios is provided.	Protection against internal hazards is important for specific DBAs.	NA	Item will be removed (comments by other countries)		

4	7.	Suggest adding a bullet to address consideration of appropriate combination of hazards simultaneously occurring.	To complete internal hazards listing.	Yes	This issue will be included in the text		
5	7.	Suggest adding a discussion or reference to existing documents that would indicate that protection of safety features for design extension conditions (DECs) would be considered using best estimate tools and reasonable chance of survival criteria, consistent with accepted beyond design basis methodologies.	Design guidance should recognize that provisions for beyond design basis response may be evaluated using best-estimate techniques, consistent with accepted beyond design basis methodologies.			No	<p>It is not the purpose of the DPP to indicate the rules for the protection against internal hazards, neither for DBA nor for DEC. The primary mean of protection is in the layout and physical separation</p> <p>Best estimate doesn't make sense. This is a guide for design not for safety assessment. The safety features for DEC should be protected as equipment important to safety .</p> <p>Survivability doesn't exist as a concept in the IAEA SSs. This concept is applied when equipment is exposed to conditions beyond its design basis. Here the purpose it to define the protections that are necessary for the equipment, not to assess what happens to the equipment if the design basis is exceeded.</p>
6	7.	<i>Delete this bullet:</i>	"Release of hazardous substances inside the plant" is			No	This hazard type is already covered in NS-

		<ul style="list-style-type: none"> • Release of hazardous substances inside the plant 	<p>controlled primarily via station processes rather than design measures, so this internal hazard should not be assessed for design measures in the safety guide.</p>				<p>G1.11. It is required by SSR 2/1 It is not the matter if the release is controlled by “station processes” (not clear what this means) or design measures.</p> <p>If a release of a toxic, flammable, radioactive, or whatever other hazard happens, the release needs to be detected and controlled and the plant design should prevent effects from the release on the operators and/or on the equipment necessary to control the safety of the plant.</p>
--	--	--	--	--	--	--	--

COMMENTS BY REVIEWER				RESOLUTION		
Reviewer: M-L Järvinen, J. Sandberg Page.... of.... Country/Organization: Finland/STUK				Date:		
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	
	7. Overview	<ul style="list-style-type: none"> • Internal fires • Explosions • Electromagnetic fields • Internal floods • Missiles • Mechanical effects of pipe breaks and pressure vessel bursts • Collapse of structures and falling objects • Release of hazardous substances inside the plant 	<p>Add to the topic to be covered electromagnetic fields.</p> <p>Electrical and I&C Guides are included in the list of interfacing documents. In addition to other internal hazards the protection against electromagnetic fields should be added. Electromagnetic disturbances can also be an initiating event of a fire.</p> <p>The pressure vessel bursts should be covered.</p>	Partially	<p>Electromagnetic fields are mostly considered as an external hazard</p> <p>Electromagnetic interference by high voltage switchgear at the plant is possible, but the matter becomes a subject of electrical and I&C design and qualification. The use of portable communication equipment or other devices which could create interferences should be avoided by administrative procedures.</p> <p>Electromagnetic fields and electromagnetic interference are addressed in the new safety guides on the Design of electrical power systems SSG-34 and Design of I&C systems SSG-39, both in publication.</p> <p>What would be the expectations for the SG in addressing this subject?</p> <p>Pressure vessel burst if it refers to the reactor, pressurizer or SGs need to be prevented. Changed to breaks if fluid systems (this includes pipes, heat exchangers, tanks, etc) A burst is an explosion. The break doesn't mean necessarily a burst</p>	
	List of content	1. INTRODUCTION 2. OBJECTIVES AND SCOPE	The content to reflect comment above.	Partially	See previous comment	

		<p>3. GENERAL CONCEPTS</p> <p>4. INTERNAL HAZARDS TO BE CONSIDERED IN THE DESIGN</p> <p>5. INTERNAL HAZARDS POTENTIALLY INDUCED BY OTHER HAZARDS</p> <p>6. PLANT LAYOUT AND APPROACH TO BUILDING DESIGN</p> <p>7. INTERNAL FIRES</p> <p>8. EXPLOSIONS</p> <p><u>9. ELECTROMANGETIC FIELDS</u></p> <p>10. INTERNAL FLOODS</p> <p>11. MISSILES</p> <p>12. MECHANICAL EFFECTS OF PIPE BREAKS <u>AND PRESSURE VESSEL BURSTS</u></p> <p>13. COLLAPSE OF STRUCTURES AND FALLING OBJECTS</p> <p>14. RELEASE OF HAZARDOUS SUBSTANCES INSIDE THE PLANT</p>			
--	--	---	--	--	--

COMMENTS BY REVIEWER Reviewer: Japan NUSCC Country/Organization: Japan/NRA				Page 1 of 1 Date: 9 Oct. 2015				RESOLUTION			
No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modif./reject.				
1.	Chapter 5	Add the following bullet as, " <u>This guide adopts on a new nuclear power plant.</u> ".	Clarification for the scope. This guide looks focusing on a new plant but on an existing plant as clearly stated in SSR-2/1 (Rev. 1).	YES	It is a guide for design of NPPs, supporting SSR 2/1 which is for new plants. It will be clarified in the text						
2.	Chapter 7, bullet 1	<ul style="list-style-type: none"> Internal fires, <u>including high energy arcing faults</u> 	Fires caused by high energy arcing faults is one of the important events.	Yes	This is fire cause, as they are others and it is taken into account but we don't describe here the fire origins, there are many		.				
3.	Chapter 7, bullet 7	<ul style="list-style-type: none"> Release of hazardous substances inside the plant, <u>including habitability of main control room</u> 	For instance, effects on tonic gasses for MCR should be specified.	Yes	This is an effect to be prevented and it needs to be taken into account in the design, but the habitability of the control room is not part of the hazard						
4.	Chapter 7, 2 nd para., bullet 54, b	Add DS482 (Revision of NS-G-1.10) as reference here.	Be consisted with DS482 as revision of NS-G-1.10 "Design of Reactor Containment Systems for NPPs"			X	Bullet 54, b not found. The document doesn't reference to all SGs for NPP design. List is not intended to cover all guides that have some relation with the current one				

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: NUSSC Page..1.. of...1 Country/Organization: Republic of South Africa Date:							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	Last sentence of Section 2	Replace “internal hazards is relevant aspect” with “internal hazards is a relevant aspect”.	Grammar	Y			
2	Section 5, 5 th bullet	Replace “internal hazards as well as internal induced by” with “internal hazards as well as internal hazards induced by”.	Grammar	Y			
3	Section 5, 7 th bullet	Appropriate text to clarify the concern provided in the column “Reason”.	If DS494 will replace NS-G-1.11, it is not clear where the scenarios that have a specific treatment will be described, since it seems that NS-G-1.11 will then be discontinued. If the intended meaning is that they are described in documents on design and safety analysis, please add explicit references to such documents in the 7 th bullet in order to clarify the text.	Y	Bullet dropped		
4	Section 6, 2 nd par	Replace “There will be also relations” with “There will also be relations”.	Grammar	Y			
5	Section 6, 2 nd par	Replace “relations with applicable guided for nuclear security” with “relations with applicable guides for	Spelling	Y			

		nuclear security”.					
6	Section 7, last bullet	Replace “SSCs for detection, mitigation and confinement” with “SSCs for prevention, detection, mitigation and confinement”.	To make the list more complete.	Y			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Department of Safety Evaluation Country/Organization: Republic of Korea / Korea Institute of Nuclear Safety Date: October 8, 2015							
Comment No.	Para/Line No.	Identified problem/Proposed new text	Reason/Description	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	General comments	<i>To reflect the intention of the SSR-2/1 and Vienna Declaration on Nuclear Safety, integration of the existing guidelines NS-G-1.7 and NS-G-1.11 developed as a guide for the equipment is needed to develop a guideline for DEC measures. Background, justification, objective and scope of this proposed revision are appropriate and well prepared.</i>		?	The first part (until DEC measures) is not understandable		

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Mikhail Lankin Page 1 of 1 Country/Organization: Russia/SEC NRS Date:08/10/2015							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	4 (point 4 in the proposed global structure of document)	Add wording "(in design basis or in design extension conditions)" after "Internal hazards to be considered in the design"	New SSR-2/1 standard establishes two levels of accounting events in plant design (DB and DEC levels). This two levels approach is relevant to internal hazards as well. New wording expresses the idea unambiguously.			NO	Design extension conditions are part of the design basis. It is also not appropriate to put in in the title. The agreement on such terminology would affect many safety guides. This DPP or SG is not the place to make this agreement.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: M. Fritschi		Page 1 of 1					
Country/Organization:Switzerland / ENSI		Date: 2015-09-22					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	7.	The internal hazards to be addressed are listed in paragraph 7. The list should be extended, taking also into account electromagnetic interference and high energy arc faults as internal hazards.	WENRA RHWG did consider these additional two internal hazards in the draft of new Issue V "Internal Hazards". A certain harmonization between IAEA and WENRA would be welcome.	Subject for discussion	Electromagnetic interference is a matter of design and qualification of electrical and I&C equipment when referring to internal interferences, and of administrative procedures to impede the use of equipment producing the interferences. What would be the expectations for addressing this issue in the SG? High energy arc faults is also a subject of electrical design that can result into a fire or internal		

					explosion. Therefore it would be considered as a potential fire or explosion origin, not as an individual hazard.		
--	--	--	--	--	--	--	--