

DS 483
Severe Accident management Program For Nuclear Power Plants

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Moustafa Aziz Page.... of.... Country/Organization: Egypt Date:							
Comm ent No.	Para/Li ne No.	Proposed new text	Reason	Acce pted	Accepted, but modified as follows	Reject ed	Reason for modification/r ejection
1	Para 1.6 and the staff of the main control room to mitigate the consequences of severe accident	To specify the SAMG task to mitigate consequences of severe accident which is parallel to EOP function to prevent fuel degradation			x	This paragraph is 'Background' and the concurrent actions of EOPs with SAMGs is discussed in Chapter 2.
2	Para 2.9	For a multi-unit nuclear power plant site on which several units are co-located,	Each unit should has its program and also concurrent severe accidents on			x	Paragraph 2.11 states that 'all fuel locations' should addressed

		<p>the severe accident management programme should consider programme for each unit individually and also concurrent severe accidents on multiple units.</p>	<p>multiple unit should also considered [for example multiple unit may contain different types of reactors such as PWR and CANDU at the same site.</p>				<p>by the AM program and SSr2/1, Revision 1 Requirement 33 states that “Each unit shall have its own safety systems and its own safety features for design extension conditions.” The combination of this information addresses the need to have guidance for each unit on a multi-unit site.</p>
	<p>Para 2.47 page 15</p>	<p>The guidance for the mitigatory domain should be presented in an appropriate form, such as guidelines, manuals , handbooks or computerized procedure forms.</p>	<p>Computerized form of the guidance may be available as a back up (see Ds 492 chapter 8)</p>			x	<p>The text as written allows for the guidance to be provided either as hard or soft copy. Furthermore, the phrase ‘such as’ means that this is not intended to be an all</p>

							encompassing list.
	Para 4.8 page 54	If the extent of off-site preparedness is not sufficient the releases may be delayed to a later time,	Space should be left between sufficient and the			x	This comment was addressed on the 22 September version of DS483

AEA DS483 Accident Management Programmes for Nuclear Power Plants
Step 11 – 8 September 2017

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: ENSS				Page 1 of 7			
Country/Organization: ENISS				Date: 27 October 2017			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	1.6	(2)... <ul style="list-style-type: none"> Returning, to the extent possible, to <u>long term safe stable state a condition in which the fundamental safety functions are all preserved.</u> 	For better consistency with definition in 1.2. In severe accident, at least one fundamental safety function was temporary lost, and “preserved” is not adequate	x			
2	2.72	Modify the end of sentence: “... due to dispersion of radioactive material from the units at the neighboring site at which the accident has occurred may affect access to the site at which the accident has occurred. <u>units at neighboring site.</u> ”	Problem of wording. Recommendation is to avoid that the site at which the accident has occurred could affect the neighboring site.	x			
3	2.74 ÷ 2.76	Paragraphs 2.74 ÷ 2.76 are “Hardware provisions for severe accident management at multiple unit sites”. Paragraph 2.74 may be applicable for this section (only if word “severe” is deleted from both subtitle and paragraph) and paragraphs 2.75 and 2.76 should be moved to section with paragraphs 3.85 ÷ 3.90 subtitled “ HARDWARE PROVISIONS FOR SEVERE ACCIDENT MANAGEMENT ” since the requirements of paragraphs 2.75 and 2.76 are applicable for severe accident management only.	Chapter 2 is titled “General Guidance for an Accident Management Program”, and chapter 3 is dedicated to severe accidents only	x			

4	2.77	“Items important to safety for the prevention or mitigation of severe accident management should ...”	For better consistency with chapter 2 title.	x			
5	2.95	STAFFING, QUALIFICATION, TRAINING AND WORKING CONDITIONS FOR ACCIDENT MANAGEMENT	Suggestion, as many paragraphs (2.100 ÷ 2.107) in this subsection are related to training.	x			
6	2.101	“...severe...” should be deleted at the last row.	Chapter 2 is titled “General Guidance for an Accident Management Program”.	x			
7	3.1	Six main steps ... do not fully follow the structured top-down approach recommended in 2.12. In particular, development of strategies should appear as a separate step. Correspondingly the items 3.20 ÷ 3.29 should be extracted to separate subsection “DEVELOPMENT OF SEVERE ACCIDENT MANAGEMENT STRATEGIES” to follow the structured top-down approach. These strategies should be consequently converted into the procedures and guidelines in the next subsection.	Suggestion to increase internal consistency of the guidance. Development of severe accident strategies is very important part of severe accident management development and implementation process and is particularly recommended in 2.13 ÷ 2.20.			x	We believe that the text already reflects this structure.
8	3.6	SAMGs for the mitigatory domain should address the full spectrum of challenges to fission product barriers, including those arising from multiple hardware failures, human errors and postulated hazardous conditions, including extreme external hazards, and possible consequential failures and physical phenomena that may occur during the evolution of a severe accident. In the development process of SAMGs, even <u>very</u> highly improbable failures should be	For consistency with 3.1 (4) last bullet, and avoid confusion with “extremely improbable with a high degree of confidence” which is a part of what is considered practically eliminated. For such situations, which are not required to be studied, it would be difficult to provide guidance and demonstrate efficiency of this guidance. Such a recommendation seems to go beyond IAEA requirements which were updated to capture Fukushima lessons. 3.8 is sufficient to avoid exclusion of	x			

		considered.	sequences which are not practically eliminated.				
9	3.21	... <ul style="list-style-type: none"> Returning the plant to a long term safe stable state where the fundamental safety functions can be ensured 	For better consistency with definition in 1.2. The foot note 2 makes end of sentence not necessary	x			
10	3.30	The SAMGs should be aimed at mitigating the consequences of the severe accident monitoring, preserving or restoring the fundamental safety functions by means of the selected strategies. The strategies and measures selected in Section 2 paragraphs 3.20 ÷ 3.29 of this Safety Guide...	The sentence is not consistent with objectives of SAMG described in 2.14. The sentence should refer to these objectives or should remain general as proposed. The strategies and measures are selected in paragraphs 3.20 ÷ 3.29, not in Section 2.	x			
11	3.75	Add following text at the end of para: <u>"For less important decisions, the on-site emergency director may delegate decision making to a more appropriate level."</u>	For consistency with 2.86 which limits involvement of high level management of the plant to major decisions. For decision of lower importance, a graded approach to the decision should be allowed, in order to win time The basic idea of SAMGs is to quick access the plant status, identify "good enough actions" and implement them ASAP to terminate the progress of core damage and prevent/minimize further escalation accident sequence. Decision making should not be an obstacle in the process of implementing mitigative actions. In the EOP domain and until TSC is ready for making their first recommendation the shift supervisor in the control room is the decision maker. But even after the TSC is "in operation" in the mitigative domain the shift supervisor can be the decision maker for certain actions since this gives shorter			x	Introducing the undefined phrase 'less important decisions' is difficult at Step 11. Furthermore, we believe that the text in the parentheses allows for decisions to be delegated or 'clearly assigned.' Also, the graded approach is not typically used for decision making.

			<p>and quicker information lines. For example, this may include actions such as:</p> <ul style="list-style-type: none"> • Actions for “collecting” plant status data. • Proceeding with “recovery actions” initiated in preventive domain, that has not been aborted by TSC. • Prepared actions that have been evaluated without any negative consequence. (during normal operation) • Actions related to operate needed equipment to implement recommended actions. <p>In similar way decision can be on a hierarchical intermediate level i.e. head of TSC as regards SAMG recommendations which only affect conditions inside the plant.</p> <p>The prerequisite is that the actions have only limited consequences, it’s documented (rule-based) in appropriate SAG and coordinated and integrated with decision making authority within the Emergency Response Organization.</p>				
12	3.78	<p>“...the corporate engineering department. <i>The emergency director serves as the ultimate decision maker in case of any differences of opinion within the emergency response organization. He may delegate part of decisions only affecting the status inside the plant to an intermediate hieratical level to gain speed in the decision making process.</i>”</p>	<p>Based on the same reasons as comment on para. 3.75. This paragraph does not enable at all a graded approach on decision making, which could lead to loss of time</p>			x	<p>The text in the parentheses in paragraph 3.75 allows for decision making to be ‘clearly assigned’ (in other words delegated) so this issue is already</p>

							addressed. Furthermore, the graded approach is not applied to decision making.
13	3.106	<p>“...Severe Accidents affecting multiple units should be analysed...”</p> <p>And move this recommendation to chapter 2</p>	<p>SSR 2/2 para 5.8A requires that: “concurrent accidents affecting all units shall be considered in the accident management programme”. Adding the word “severe” and placing it in this section and not in chap 2 seems beyond the requirement</p> <p>However, plant damage states should be identified based on PSA results (see 3.107) and set of analyses should be based on that (which may include multiple unit severe accidents).</p>		x		<p>Sentence modified using text adapted from SSR-2/2, Revision 1 paragraph 5.8A to be “For a multi-unit nuclear power plant site, concurrent accidents affecting all units should be analysed.”</p>
14	3.99 3.110	Suggest merging these two paragraphs to one.	Both paragraphs describe very similarly the use of analyses results.			x	Paragraph 3.100 (and 3.101) are discussing plant capabilities and paragraph 3.99 is focused on the development of strategies, procedures and guidelines so we recommend leaving them separate.

15	3.112 ÷ 3.117	<p>TRAINING EXERCISES AND DRILLS FOR ACCIDENT MANAGEMENT</p> <p>This section should be either titled "...FOR SEVERE ACCIDENT MANAGEMENT" or merged with "STAFFING, QUALIFICATION AND WORKING CONDITIONS FOR ACCIDENT MANAGEMENT" in section 2.</p>	<p>The recommendations in these paragraphs are applicable not only for severe accident management training but generally for accident management training.</p>	x			
16	3.112	<p>This requirement for complementary training should be merged with the following one</p>	<p>After the reduction, the rest of this paragraph includes only recommendation related to one complementary part of the training for decision maker. The decision maker should be trained not only for loss or unreliability of instrumentation but for all scope of severe accidents. On the other hand such training (as a complementary training) should be provided not only to decision makers but also to other persons involved in severe accident management, at least the TSC staff</p>			x	<p>The portion of the paragraph deleted in Chapter 3 was moved to Chapter 2 (see paragraph 2.99) so the text is not lost. The remaining text is distinct from 3.113 so we recommend leaving it as a separate paragraph.</p>

Japan NUSSC Comments on DS483 “Accident Management Programmes for NPPs” (Mode 2, 8 September 2017)

COMMENTS BY REVIEWER				Resolution			
Reviewer: Japan NUSSC member		Page of 1					
Country/Organization: Japan/NRA		Date: 26 Oct., 2017					
Com ment No.	Para/Li ne No.	Proposed new text	Reason	Acce pted	Accepted, but modified as follows	Rejec ted	Reason for modification/rejection
1.	3.9. & 3.10.	Para 3.9. and 3.10. should be moved after 3.4.	These paras are describing about general development of SAMGs, therefore it is not a good way to state in the sub-section of “IDENTIFICATION OF CHALLENGE MECHANISMS”.	x			
2.	Fig. 3	Add the footnote on “Plant states“ as follows; This definition is wider scope as stated in the DEFINITIONS of SSR-2/1 (Rev. 1) as included severe fuel degradation in SFP.	Clarification.			x	We believe that the use of the term plant state in this context is consistent with the IAEA Safety Glossary

Severe Accident Management programmes for nuclear power plants (DS483)

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Country/Organization: Republic of Korea/Korea Institute of Nuclear Safety Date:							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	(P 23) Para 2.51/ Line 4	(Current) ~ supporting procedures or guidelines <u>may</u> developed on the use of instrumentation and equipment to cope with such conditions (Proposed) ~ supporting procedures or guidelines <u>should</u> developed on the use of instrumentation and equipment to cope with such conditions	To keep consistency. In the next sentence, 'should' is used.	x			
2	(P 28) Para 2.79/ Line 7	(Current) ~ related design requirements should be such that there is reasonable assurance ~ (Proposed) ~ related design requirements should be <u>set up</u> such that there is reasonable assurance ~	The sentence is not clear in part of '~ should be.' In order to the clarity, it is added to verb 'set up'.		x		
3	(P 31) Para 2.93/ Line 4	(Current) ~ Accident management should be implemented such that <u>that</u> all teams have a common situational awareness (Proposed) ~ Accident management should be implemented such that all teams	The word 'that' may be duplicate. So it needs to be delete.	x			

		have a common situational awareness					
4	(P 40) Para 3.14/ Line 1	(Current) All plant capabilities available to fulfil and support the plant's safety functions should be identified and characterized. (Proposed) All plant capabilities available to fulfil and support the plant's <u>fundamental</u> safety functions should be identified and characterized.	In order to the consistency, it is needed a word 'fundamental' to the ahead of safety function.	X			
5	(P 56) Para 3.80/ Line 8	(Current) ~ As the staff of the main control room <u>staff</u> are also responsible for the execution of the measures decided upon by the emergency director ~ (Proposed) ~ As the staff of the main control room are also responsible for the execution of the measures decided upon by the emergency director ~	The word 'staff' may be duplicate. So it needs to be delete.	x			
6	(P 56) Para 3.81/ Line 5	(Current) ~ as necessary with the staff of the main control room to benefit from their expertise <u>of</u> and insight into the plant capabilities. (Proposed) ~ as necessary with the staff of the main control room to benefit from their expertise and insight into the plant capabilities.	The word 'of' after the 'their expertise' needs to be delete.	x			
7	(P 65) Para 3.121/ Line 2	(Current) ~ the capability of installed equipment and the accident	In order to the consistency, it is needed a word 'fundamental' to	x			

		<p>management procedures and guidelines should be evaluated to determine if safety functions could be compromised. (Proposed) ~ the capability of installed equipment and the accident management procedures and guidelines should be evaluated to determine if <u>fundamental</u> safety functions could be compromised.</p>	<p>the ahead of safety function.</p>				
--	--	---	--------------------------------------	--	--	--	--

TITLE: Accident Management Programme for NPPs. – DS 483

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Dr Ali Tehrani/Robert Moscrop		Page 1 of 4					
Country/Organization: UK - Office for Nuclear Regulation (ONR)		Date: 25/10/2017					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
General		<p>This well written Safety Guide covering a broad range of topics relating to the management of design basis and severe accidents. It also covers a number of feature and aspects of the design that are required during and post severe accidents.</p> <p>The revised version gives consideration to the previous comments raised by ONR.</p>					
General	Title of the Report	<p>I note that “severe” has been removed from the title. The content is largely focused on BDBAs and SAs and as such this should be reflected in the title.</p>	<p>Provides a better focus on the objective of the report.</p>			x	<p>The title was discussed at length during the August NUSSC volunteer’s meeting and it was decided to remove the word severe to be consistent with the IAEA Safety Glossary and the fact that DS4893 covers both prevention and mitigation.</p>
General		<p>The document could benefit from a severe accident definition – this can be a reference to an existing</p>				x	<p>The IAEA Safety Glossary contains a definition of ‘severe</p>

		definition elsewhere. Note that ONR has such a definition – see Para 664 of the ONR SAPs 2014 as a fault sequence that could lead to a release >100mSv (conservatively assessed) OR to an unintended relocation of a substantial quantity of radioactive material within the facility that places a demand on the integrity of the remaining physical barriers.					accident’ and this definition was used as one of the bases for the content and scope of DS483.
General		The authors could review the report with a view to reducing or rationalizing the report to reduce repetition.	Reducing the extent of repetition within the report will provide focus on the areas of significant importance.			x	DS483 is at Step 11 of the SPESS process and the Secretariat cannot make such sweeping changes at this point in the process.
1	1.3	Suggested replacement: Accident management, including severe accident, is therefore an essential component of the application of defense in depth to prevent or mitigate the consequences of a severe accident [21– 54]. It is intended to complement the operating procedures developed for the operating reactor and its associated facilities for; normal operation, anticipated operational occurrences and accidents conditions as required by IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), Safety of	Slightly modified to provide clarity.			x	The language in the quotation in Paragraph 1.3 is derived from SSR-2/2 and we can’t modify this language in a Safety Guide.

		Nuclear Power Plants: Commissioning and Operation [56].					
General	1.6, etc	Please reinstate “Fuel” instead of “Fuel rod”	The term “fuel” is well understood by the nuclear community and it is a clearer term.			x	This issue was discussed at length during the NUSCC volunteers meeting and the use of ‘fuel rod’ in this case was adopted to reflect the sequencing of severe accidents.
General	Section 2	This Section can benefit from an addition highlighting the transition from DECA events to DECB events.	Add clarity to the requirements Section.			x	Paragraph 2.30 explained a transition from EOPs to SAMGs, which may mean a transition from DEC (a) to DEC (b). Please see Fig. 3. DS483 recognizes design concepts such as DEC, but because it is primarily an operational guide it is more appropriate to refer to the state of the fuel rods.
General		Consideration of adverse weather conditions in the SAMGs would need to be incorporated in the narrative.				x	SAMGs take account of ‘adverse weather’ via consideration of external hazards.
2	2.15	The expectation to “delay or	Adds clarity to the	x			

		minimize” is reasonable, but perhaps this should be coupled with reasonably practicable.	expectation.				
3	2.26	“identifiable mechanisms” could be replaced with “reasonably foreseeable scenarios”.	In line with the understood terminology		x		Modified to be consistent with language in SSR-2/2, Revision 1 paragraph 2.1 as ‘reasonable foreseeable mechanisms.’
4	2.28	Suggest you replace: “Accident management guidance should be robust, which can be ensured by the following:” with “Accident management guidance should be robust, by giving consideration to the following”:	This highlights that the list is not exhaustive.	x			
5	2.59	This Para would need to refer to the need for a plant walkdown to appropriately validate the arrangements.	Enhance the validity of the approach.	x			
6	2.81	Suggested replacement: New equipment identified in support of accident management should be designed against predicted accident conditions giving due consideration of the environment arising from internal and external hazards.	Adds clarity to the expectations.	x			
7	3.21	Consideration should be given to reflecting on the risk of re-criticality during post-accident conditions.	Provides a view on the measures for consideration.			x	This is already addressed via the specification that the end state is a

							‘long term safe stable’ state which is defined as ‘a plant state following an anticipated operational occurrence or accident conditions, in which the reactor is subcritical and the fundamental safety functions can be ensured and maintained stable for a long time.’ (see footnote 2)
8	3.88	The authors may wish to consider the need to monitor the water level in the in-built water sources such as the IRWST.	Provides a view on the in-built mitigation measures to help with the SAMGs.			x	We believe that this consideration is covered in a general sense by the first bullet which discusses water level monitoring in the containment.