

Draft Safety Guide DS483 “Accident Management Programmes for Nuclear Power Plants” (Version dated 9 April 2015)

Status: STEP 7 – First review of the draft safety standard by the SSCs

Austria

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: N.Muellner Page..1.. of. 2.. Country/Organization: Austria/BMLFUW(Consultant) Date: 1 st of June 2015							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	2.1	“Measures are required to be taken to ensure that the radiological consequences ...	Editing comment – the quotation is not closed	Corrected to close the quotation			
2	2.5	An accident management programme should shall be developed and implemented for all plants irrespective of the core damage frequency and fission product release frequency calculated for the plant, including new plants equipped with dedicated systems for mitigation of severe accidents	This is a <u>requirement</u> – not a recommendation (this is a " <u>shall</u> " statement, not a " <u>should</u> " statement). See Requirement 2.10 in SSR-2/1; and Requirement 19 of SSR-2/2. The latter states that an accident management program <u>shall</u> be established. The Safety Guide should not reduce a requirement to a recommendation. A quotation, like in §2.2 which quotes the requirement in SSR-2/1, would be more useful here. This type of confusion is	Corrected			Corrected as “shell” because it was quoted from Safety Requirement SSR2/1

			present throughout Chapter 2 (see, for example, Paragraphs 2.11-2.27 and Paragraphs 2.43-2.47				
3	P16, footnote 29	For example, steam explosions, direct containment heating, hydrogen burns and containment bypass phenomena such as steam generator tube rupture	Proposal to add to the examples here the issue of containment bypass (such as by steam generator tube rupture for PWRs and VVERs).	Added more examples			Added more examples for better clarity
4	3.65	"The development of accident management guidance should take into account the habitability, operability and accessibility of the control room or and the Technical Support Centre."	If the main control room is uninhabitable because of high radiation doses, physical damage, or unavailability of power, it is highly likely that the TSC would also be similarly affected. It is therefore suggested to replace or with and.	Corrected as "and"			The TSC would be also considered to be maintained similarly with the control room.

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Belgium

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Thibaut Van Rompuy		Page 1 of 9					
Country/Organization: Belgium / Bel V		Date: 15-05-2015					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	2.11	The teams responsible for execution of accident management strategies should be adequately staffed and , qualified and regularly trained.	To emphasize that only initial training is not enough and team cooperation and routines need to be well established.	Added “regularly trained”			To clarify the train will be taken regularly.
2	2.14	Accident management guidance... should be developed... to minimize the impact on public health and safety, the environment as well as the economy.	The impact of a severe accident is not limited to the health and safety of the public. In fact, the impact on the economy and environment are probably even more to be dreaded (when compared to other, accepted, risks of modern society.		Added “social impacts”		Social impacts include social infrastructure and economic.
3	2.29 The equipment should be ... installed in areas that are not likely to collapse, flood or burn and create un-repairable damage to the component...	Collapse of a certain area is not the only threat to the integrity of equipment.		Reword: “such that there is reasonable assurance that the equipment or instrumentation will operate as intended under		It is redundancy with previous sentence.

					the environmental conditions present when it should be used”		
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4	3.8	<i>No new text, please remove entirely.</i>	Redundant with 3.4 and 3.6.	Delete 3.8			Redundant with 3.4 and 3.6.
5	3.9	<i>Please add a bullet: “Possible restrictions on the accessibility of certain areas for performing local actions.”</i>	Possible restrictions on the accessibility of certain areas for performing local actions need also to be considered when developing an accident management programme.	Added new bullet			Accessibility of certain areas for performing local actions should be considered during accident conditions.
6	Footnote 32	Vulnerabilities could be created by loss of communication with the control room, physical damage to the control room (...), harsh environmental conditions in the control room (radiological conditions, toxic gases, smoke, ...) or staff injuries or even death.	If the control room becomes inhabitable, although it is still undamaged, it is also to be considered as “lost” (at least temporarily).	Add example			It is also needed to be considered other harsh environmental conditions
7	3.29	<i>Please add the following bullets:</i> <ul style="list-style-type: none"> • Maintaining the integrity of the reactor vessel. • Maintaining subcriticality. 	Those are also objectives to be strived for during severe accident management.	Added new bullets			To clarify the objectives of the accident management

8	3.35	For strategies ..., steps should be taken to ... within the time frame necessary to avoid loss of critical safety functions, taking into account possible adverse conditions on the site.	In particular for portable equipment to be used in case of extreme external events, the effect of adverse conditions on site on the time necessary to	Added new words			To consider the effect of adverse conditions to use portable equipment.
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9	Footnote 40	... (e.g. cracks resulting from verey severe mechanical loadings)	install and operate this equipment should be taken into account. Typing error.	Corrected			To correct the typo error
10	3.39	<i>All else being equal</i> , strategies should be preferred which...	Certainly, strategies leading to the accumulation of large amounts of potentially contaminated water are to be preferred if those strategies have a much higher probability of e.g. stopping core melt progression than strategies involving much lower quantities of contaminated water.	Added new words			To clarify he important of the strategy leading to the accumulation of large amounts of potentially contaminated water.

11	3.44	<i>Please add a bullet: "Consideration of long-term accident management."</i>	Procedures and guidelines should also contain this element given that, if possible, actions which do not lead to large problems for long-term management should be given preference to actions that do.	Added new bullet			To clarify the important of the long-term accident management
12	3.47	However, a potential misdiagnosis of the plant conditions should not preclude execution of the guidelines.	This recommendation seems very difficult to meet, given that guidelines will not be executed if severe core	deleted			Redundancy with 3.48

			damage is not diagnosed.				
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13	3.65	The development of accident management guidance should take into account the habitability, operability and accessibility of the control room or and the Technical Support Centre. Accessibility of other relevant areas, such as areas for local actions should also be assessed and taken into account in the development of severe accident management guidance. It should be investigated whether ... may give rise to a need for restrictions for personnel access to such areas and if this is found to be the case, appropriate measures have to be foreseen.	To avoid (deliberate) misinterpretation.	added			To clarify the statement
14	3.71	... are needed to: <ul style="list-style-type: none"> • reduce or delay challenges to ... • reduce or delay challenges that could lead to potential failure of fission product barriers. 	Modifications in hardware provisions might also be necessary to delay challenges leading to potential failures of fission product barriers, e.g. early containment failure is certainly worse than late containment failure.	Added			To clarify the statement
15	Footnote 58	... the long term running of highly contaminated residual heat removal	Typing error	Corrected			To correct typo error

16	3.75	<p>pump without...</p> <p>... for the following functions should be taken into account:</p> <ul style="list-style-type: none"> • ... • Prevention and mitigation of dominant challenges, such as for instance: <ul style="list-style-type: none"> – Containment overpressure and underpressure, – ... 	<p>The list of dominant challenges should not be described in a limitative way, as some challenges specific to certain reactor types might have been omitted. For instance hydrogen deflagration/explosion seems to have been omitted.</p>	Added			To clarify the statement
17	3.82	<p>... within the timeframes necessary (taking into account possible adverse conditions) to prevent loss of fission product barriers.</p>	<p>Installing and operating portable or mobile equipment might take considerably more time if adverse conditions are to be faced, but it is during such adverse conditions that this equipment might be needed.</p>	Added			To consider possible adverse conditions to us portable or mobile equipment.

18	3.102	<p>Guidance should be put in place... and only the part of the emergency response organization located at the plant site remains functional in case of failure of the primary communications systems and period.</p>	<p>This last part of the sentence seems very strange and the sentence looks perfectly acceptable without it.</p>		Add "The effects SBO on the communications equipment should be considered"		To clarify the statement
19	3.115	<p>... should be considered in the allocation of responsibilities, period when placing the decision making</p>	<p>Word "period" to be deleted in the sentence in</p>	Delete			To clarify the statement

20	3.137	<p>authority...</p> <p>Validation should include an independent, cross-functional safety review of the plant and should be performed with the objective of fully understanding all accident management implications. ...</p>	<p>order to make sense.</p> <p>Some word appears to be missing.</p>	Add “and”			To correct the sentence
21	3.165	<p>... The full list of plant damage states should be screened, letting out less important plant damage states...</p>	<p>Some word appears to be missing.</p>		Deleted “out” and added “for the less important...”		To clarify the statement

22	3.172	<p>... in prediction of key physical and chemical phenomena and ...</p>	<p>Chemical phenomena during a severe accident will also influence the outcome of the accident (e.g. Zr oxidation is a chemical phenomenon).</p>	Added			To clarify the statement
23	3.175	<p>... should be the responsibility of the operating organization and follow be consistent with the applicable IAEA safety requirements...</p>	<p>This recommendation to <u>follow</u> IAEA guidance is too restrictive: the operating organization might be willing to go beyond IAEA safety requirements, in order to further improve the SA management at the plant. In that case “following” IAEA safety requirements</p>	Replaced			To clarify the statement

			could be interpreted as “sticking as much as possible to the IAEA guidance and hence not consider possible further improvements not included in this guidance”				
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24	3.176	The O operating organization should integrate all the elements of the accident management programme with the existing management system so that processes and activities that may affect safety are established and conducted coherently with the protection of site personnel, and the public and protection of the environment.	Improvement of the clarity of the text.	Corrected			To clarify the statement
25	4.7	The work at the technical support center should be well structured and based on a clear task description.....	Improvement of the clarity of the text + correction of spelling error.	Corrected			To correct typo error.

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China

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: P.R. CHINA NUSSC member Country/Organization: P.R. China / NNSA Date: 26 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	1.1/3	-- are kept within authorized <u>acceptable</u> limits [1].	Be consistent with SSR-2/1	Replaced			Acceptable limit. A limit acceptable to the regulatory body. The term authorized limit should be used to refer to limits on doses or risks, or on releases of radionuclides, which are acceptable to the regulatory body on the assumption that they are likely to occur.
2	2.14/4	“Accident management guidance should be developed <u>for high credible challenges</u> irrespective of their probability of occurrence of the challenges.”	Recommend using “high credible challenges” instead of “challenges”	Added “credible”			To clarify the statement
3	2.15/1	...consider that in case of <u>extreme external events</u> ⁸ . Recommend clarifying how these <u>extreme external events</u> are defined.			Described in para. 2.15 “Accident management guidance should also consider, where deemed necessary, that		To clarify the word

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Reviewers: P.R. CHINA NUSSC member Country/Organization: P.R. China / NNSA Date: 26 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
					in case of extreme external events, there may be extensive infrastructure damage, so that offsite resources are not readily available, including human resources and/or communication, electrical power, compressed air, water and fuel” and in footnote 10.		
4	2.23/1	Generally , accident management guidance should be set out in such a way that it is not necessary for the responsible staff to identify the accident sequence...	For DBA(also some BDBA) management, the EOP can be developed by event-oriented methodology or state-oriented methodology.	Added “Generally”			To clarify the statement
5	3.8/1	..including extreme external events , Recommend clarifying how these extreme external events are considered in accident management.			Delete 3.8		To avoid redundancy with 3.4 and 3.6
6	3.65/2	The development of accident management guidance should take into account the habitability, operability and accessibility of the control room or the		Changed “or” with “and”			To clarify the statement

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: P.R. CHINA NUSSC member Country/Organization: P.R. China / NNSA Date: 26 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		Technical Support Centre. Recommend clarifying if it means the design basis is the same for control room and TSC.					
7	3.122/4	Original: "In particular, a highly reliable communication network should be provided," Recommend clarifying how reliable is reliable enough.		Added a footnote			To clarify the word " reliable communication " For examples: The provision of diverse communication methods, including land lines (phones and faxes), mobile radios, satellite phones, microwave phones and voice-powered phones, should be considered a commendable practice; secure emergency power sources, including uninterruptible power supplies. Provision of sufficient batteries for a prolonged event and/or hand crank battery chargers/generators should be necessary;
8	3.132/1	The physical location of the technical support centre should be designed against extreme external events. Recommend clarifying the design basis			Same as 3		To clarify the statement

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: P.R. CHINA NUSSC member Country/Organization: P.R. China / NNSA Date: 26 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		of TSC.					

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Germany

Note: Blue parts are those to be added in the text. ~~Red parts~~ are those to be deleted in the text.

COMMENTS BY REVIEWER				RESOLUTION				
Reviewer: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) (with comments of GRS) Country/Organization: Germany				Page 1 of 33 Date: 2015-05-29				
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	1	1.1	BACKGROUND Design basis accidents are defined as accident conditions against which a facility is designed according to established design criteria, and for which the damage to the fuel, and the release of radioactive material, are kept within authorized limits [4 5].	The clear intention of the Safety Guide NS-G-2.15 and the SRS No. 32 issued first was to describe how the design of existing NPPs can be enhanced by measures and guidance for the prevention and mitigation of severe accidents named Accident Management Programme. SSR-2/1 Paras 1.2 and 1.3 (see end of comment) clearly state what is the difference between considerations for severe accidents in existing and in new NPPs, what is no longer the case in the DS483 if it should be applicable for both reactor types.	Corrected			To correct the reference
1	2	1.2	Design E extension C conditions comprise accident conditions more severe than a design basis accident. A d Design extension conditions <u>may or may not involve nuclear fuel degradation (either in the core or at other locations where fuel is stored); the earlier one are</u> -Accident conditions more severe than a design basis accident and involving significant fuel degradation are termed severe accidents [5].	In general, consideration of severe accidents in the design of new plants is clearly an objective (compare SSR-2/1), but it cannot simply be achieved by adding “a few lines (see e.g. Paras 1.3, 1.10 in DS483)” to the previous Safety Guide NS-G-2.15, while the overall number of paragraphs and requirements are in principle	Replaced			To clarify the statement
1	3	1.3	Consideration of design extension conditions in the design of <u>new nuclear power plants¹ or in the enhancement of the design of existing nuclear power plants¹</u> is an essential component of the defence-in-depth approach used in nuclear safety [2- 4 5]. The		Replaced			To consistence with SSR-2/1

1	4	1.3x	<p>probability of occurrence of a design extension condition is very low, but it may lead to significant consequences resulting from degradation of the nuclear fuel.</p> <p><u>A set of design extension conditions shall be derived on the basis of engineering judgement, deterministic assessments and probabilistic assessments for the purpose of further improving the safety of the nuclear power plant by enhancing the plant's capabilities to withstand, without unacceptable radiological consequences, accidents that are either more severe than design basis accidents or that involve additional failures, and should cover all external events relevant for the site considered, taking into account dependencies between events.</u></p> <p><u>These design extension conditions shall be used to identify the additional accident scenarios to be addressed in the planning of practicable provisions for the prevention of such accidents or the mitigation of their consequences if they do occur – named accident management.</u></p>	<p>unchanged and are fully applicable for existing NPPs only.</p> <p>Requirements in NS-G-2.15 and in DS483 related to the prevention/mitigation of radioactive releases are less stringent as for new plants, e.g. no practically elimination of DEC's or scenarios that could lead to significant radioactive releases are requested as it is foreseen for new plants. Also other requirements of SSR-2/1 for new plants related to the independency (DiD concept) of AM provisions/SCC of levels 3b and 4 are not described in DS483.</p> <p>With the proposed modifications: the extension of the applicability of the DS483 to new plants (see e.g. Paras 1.3 and 1.10) and the use of the term DEC for existing plants (while it was defined for new NPPs in SSR-2/1), the clear definitions, objectives and requirements of an AMP for existing plants as it was defined in NS-G-2.15 are no longer given.</p> <p>It is recommended to leave the DS483 applicability mainly for existing plants and to write a statement opposite as it is done in SSR-2/1 (Para 1.3, see below) that it might be possible and practicable to apply some of the requirements of this Safety Requirements to DS483 as well to the development of AM provisions in new plants, which are typically already implemented during the design of new nuclear power plants or those</p>	<p>Added</p> <p><u>These design extension conditions shall be used to identify the additional accident scenarios to be addressed in the planning of practicable provisions for the prevention of such accidents or the mitigation of their consequences if they do occur – named accident management.</u></p>	<p>1st part is stated in many places</p>	<p>To add relevant requirements in consistence with SSR-2/1</p>
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plants that are already under construction. Furthermore, it is recommended to add Para 1.3x which is written in analogy to Requirement 20 of SSR-2/1 to make it more clear, how a set of design extension conditions shall be derived, if the wording still should be used here for AMP for existing power plants. In addition, as consideration of external events is included now to a very large extent, it should already be added here in the beginning (yellow marked addition). In DS483 it is first mentioned in Para 2.27.

Related text of SSR-2/1:

SSR-2/1: “1.2 The designs of many existing nuclear power plants, as well as the designs for new nuclear power plants, have been enhanced to include additional measures to mitigate the consequences of complex accident sequences involving multiple failures and of severe accidents.

Complementary systems and equipment with new capabilities have been backfitted to many existing nuclear power plants to aid in the prevention of severe accidents and the mitigation of their consequences.

Guidance on the mitigation of the consequences of severe accidents has been provided at most existing nuclear power plants.

The design of new nuclear power plants now explicitly includes the

				<p><u>consideration of severe accident scenarios and strategies for their management.”</u></p> <p># SSR-2/1: “1.3. <u>It might not be practicable to apply all the requirements of this Safety Requirements publication to nuclear power plants that are already in operation or under construction; in addition, it might not be feasible to modify designs that have already been approved by regulatory bodies. For the safety analysis of such designs, it is expected that a comparison will be made with the current standards, for example as part of the periodic safety review for the plant, to determine whether the safe operation of the plant could be further enhanced by means of reasonably practicable safety improvements.”</u></p>			
1	5	<p>1.4</p> <p>Accident management is the taking of a set of actions during the evolution of accident conditions with the objective of: preventing progression into a severe accident, mitigating the consequences of a severe accident, and achieving a long-term safe stable state [6].-</p> <p>1.5 Depending on plant status, accident management actions are prioritized as follows:- -Before the onset of fuel damage, priority is given to preventing the escalation of the event into a severe accident (preventive domain of accident management). In this the domain, actions are implemented for stopping accident progression before the</p>	<p>As similar topics are mentioned in Paras 1.4 and 1.5, both Paras could be combined to avoid unnecessary duplications.</p> <p>Different requirements related to the same subject – prevention or mitigation – should not be specified within an Specific Safety Guide. In Para 2.9 (and partly repeated in Para 3.29) a more detailed list of preventive and mitigative actions is contained, which did not agree to Para 1.5. It is more comprehensive and it is recommended to be repeated here.</p> <p>If the intention of the DS483 is to</p>			<p>Keep it because 1.4 and 1.5 are distinguish h. 1.4 is objective of AM and 1.5 is a periodization of AM actions depending on plant status.</p>	<p>To clarify the objectives and actions</p>

		<p>onset of fuel damage, or, delaying the time at which significant fuel degradation happens.</p> <p>When plant conditions indicate that fuel damage has occurred or is imminent (mitigatory domain of accident management), priority is given to mitigating the consequences of severe accidents through²:</p> <ul style="list-style-type: none"> – preventing the uncontrolled loss of containment integrity, – performing any other actions having the potential for limiting fission product releases to the environment and avoiding releases of radionuclides causing long term off-site contamination. <p>including:</p> <ul style="list-style-type: none"> - Preventing severe fuel damage by termination of accident progression before the onset of fuel damage, or, delaying the time at which significant fuel degradation happens; - Terminating the progress of fuel damage once it has started; - Maintaining the integrity of the containment or any other confinement of fuel and preventing containment by-pass; - Mitigating Minimizing releases of radioactive materials, including releases from any location of fuel source of radioactive material outside containment⁵; and - Achieving a long term safe stable state. <p>Characteristics of preventive and mitigatory domains of accident management are summarized in Table 1.</p>	<p>include SFP accidents and accidents in other fuel storages as well (see Para 1.7 of DS483), than the retention of the confinement function of the fuel stored outside the containment should have as well priority in a severe accident.</p> <p>There is an inconsistency in the requirements related to prevention/mitigation of radionuclide releases. Only here in Para 1.5 “avoiding releases of radionuclides causing long term off-site contamination” is mentioned and as well in Para 3.64 in relation to containment venting: “When containment venting is possible ... and to avoid releases of radionuclides causing long-term off-site contamination.”</p> <p>Requirements related to radioactive releases should be always the same. Footnote No. 2 is proposed to be deleted also (see below).</p> <p>If the request is that unfiltered containment venting as a means of the AMP is to be prevented, or if the filter capacity should be specified in this way, it should be made more clear in Para 3.64.</p> <p>The yellow marked words have been added or modified from the original text of Paras 1.4, 1.5 and 2.9.</p> <p>It is further recommended to delete table 1 as it contains information which are not fully consistent with the</p>				
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			Table 1: Characteristics of the preventive and mitigatory domains of accident management	rest of DS483. This information is not needed as an introduction.				
1	6	Foot-note No. 2	²The second aspect of accident management (to mitigate the consequences of a severe accident) is also termed severe accident management. Accident management is essential to ensure effective defence in depth at the fourth level [2,3]. The aim of the fourth level of defines in depth is to ensure that radioactive releases are kept as low as practicable. The protection of the containment function is most important for achieving this aim. Limiting external releases has the potential for minimizing detrimental consequences on the public, the environment and society beyond the site boundary.	The Footnote No. 2 should be deleted as it contains requirements which are not fully consistent with the rest in the DS483, e.g. related “... to ensure that radioactive releases are kept as low as practicable”. If this is the intention in DS483, it should be added consistently into the text.	Deleted			To avoid redundancy
1	7	1.6	Effective implementation of accident management <u>in existing plants</u> is done through an accident management programme <u>while already the design of new nuclear power plants explicitly includes the consideration of severe accident scenarios and strategies for their management.</u> This programme <u>Accident management</u> encompasses plans ...	It is not yet clear how procedures developed along with the measures implemented in new plants related to DECAs, which may comprise as well of passive safety features (external cooling of RPV, core catchers, passive containment cooling etc.), are called and how such ones should be developed. Using the same name – AMP – for both may imply that the development was done in a similar way as for AMP for existing plants, what is not necessarily the case. On the other hand, the general requirements on accident management (2 nd sentence and the following ones of Para 1.6) would apply for new plants as well. If the term “accident management” is defined, as proposed with Para 1.3x (see comment No. 4), it could be consistently used here as	Replaced			To clarify the para.

				well and the paragraph would than fit to both kinds of power plants – old and new ones.				
1	8	1.7	<p>The accident management programme respectively the considerations for severe accident scenarios and the strategies for their management needs to consider all modes of operation. all possible conditions, including combinations of events that could cause failure of fuel cooling and ultimately significant releases. Such conditions should include those that could exist in areas where spent fuel is stored. An effective accident management programme Such requires that plants establish the necessary infrastructure to respond effectively to severe accident conditions, mitigate fuel damage, and stabilize the units if fuel damage does occur. This infrastructure should include equipment and supporting procedures necessary to respond to events that may affect multiple units and last for extended periods, and personnel having adequate skills for using such equipment and implementing supporting procedures.</p>	<p>The paragraph could be modified such that it is valid for AMP and severe accident management in new plants. Mentioning other areas of spent fuel storage is no longer necessary if the proposed modification of Para 1.2 (see comment No. 2) is accepted, what was assumed. It would be sufficient to mention that the measures should be made for all plant states, as mentioning external events was added by proposal to Para 1.3x (see comment No. 4). As well it is covered in the subsection SCOPE.</p>		Delete “Such conditions should include those that could exist in areas where spent fuel is stored” which is redundancy		To avoid redundancy
1	9	1.8	<p>OBJECTIVE This Safety Guide presents recommendations for the development and implementation of an accident management programme mainly for existing nuclear power plants for meeting the requirements for accident management that are established in relevant IAEA Safety Requirements publications for design [5], commissioning and operation [6], safety assessment [7] and emergency preparedness and response [8], as long as they are applicable for further enhancements of nuclear safety by means of reasonably</p>	<p>The references [5] and [6] (minimum) have been updated recently and are considered being relevant especially for new reactors (see below Paras of SSR-2/1 as example), while case-by-case decisions are needed for application of it to existing plants (see Para 1.3 of SSR-2/1 below). This holds especially true for the implementation of measures respectively SSC for accident management; the requirements in SSR-2/1 are much stronger for new plants as such being applicable for existing</p>	Added “It is also applicable for further enhancements of nuclear safety by means of reasonably practicable safety improvements.”	Applicable for both exist and new NPPs		To clarify the para.

		<p>practicable safety improvements.</p> <p>How considerations for severe accident scenarios and the strategies for their management in new plants are to be developed and implemented following the IAEA Safety Requirements for design [5], commissioning and operation [6], and safety assessment [7] is out of scope here. Some general aspects may still be applicable as well to new plants.</p>	<p>plants with regard to AMP. We may here also refer to the WENRA safety reference levels for new plants as of 2014.</p> <p>The previous Safety Guide NS-G-2.15 has made reference in the subsection OBJECTIVE to the previous Safety Requirements NS-R-1 and NS-R-2 which have been developed for existing plants. Therefore, consistency was given with the requirements so far in NS-G-2.15, what is no longer the case for updated DS483 if reference is made to [5] and [6].</p> <p>A proposal is made reflecting what is said in SSR-2/1 (Para 1.3) and mentioning that mainly recommendations for the development and implementation of an AMP for existing plants (what should be still the main objective of DS483 as already discussed above.</p> <p>SSR-2/1: # “1.1. The present publication supersedes the Safety Requirements publication on Safety of Nuclear Power Plants: Design (IAEA Safety Standards Series No. NS-R-1) issued in 2000. ...” # “1.3. It might not be practicable to apply all the requirements of this Safety Requirements publication to nuclear power plants that are already in operation or under construction; in addition, it might not be feasible to modify designs that have already been</p>				
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				approved by regulatory bodies. For the safety analysis of such designs, it is expected that a comparison will be made with the current standards, for example as part of the periodic safety review for the plant, to determine whether the safe operation of the plant could be further enhanced by means of reasonably practicable safety improvements.”				
1	10	1.9	<p>SCOPE This Safety Guide provides recommendations for the development and implementation of an accident management programme <u>mainly for existing nuclear power plants</u> during all modes of operation for the both-reactor, and the spent fuel pool <u>or any other location of fuel</u> to prevent and/or to mitigate the consequences of severe accidents³.</p> <p>³ More details can be found in references- [10–15] [8].</p>	<p>If the above text in subsection BACKGROUND is changed, this must be done in subsection SCOPE as well.</p> <p>Refs. [10–15] in Footnote No. 3 should be deleted, as these are old IAEA documents which might no longer be valid: some of them are superseded by newer IAEA documents. The Safety Requirements GS-R-2 [10] need to be replaced by the successor document GSR Part 7 (DS457, revision of GS-R-2). The final version of DS457 has been endorsed by the CSS in November 2014 and the Board of Governors in March 2015. GSR Part 7 will be established as an IAEA Safety Standard before DS483 is finalized, forcing the deletion of all links to GS-R-2 from the document.</p>		<p>Replaced without <u>“mainly for existing nuclear power plants”</u> because <u>this Safety Guide is applicable for both exist and new NPPs.</u></p>		To clarify the para.
	11	1.10	<p>Although the recommendations of this Safety Guide have been developed primarily for use for both existing and new light water reactor plants, they are anticipated to be valid <u>to some extent for new plants and</u> for other types of nuclear reactors and possibly</p>	<p>The scope of the document is still too imprecise. It should be clearly defined for which types of reactors this Safety Guide is applicable.</p>		<p><u>Added “to some extent for new plants and</u></p>		To clarify the para.

			other <u>nuclear</u> fuel cycle facilities (including <u>spent fuel</u> storage).			<u>for other types of nuclear reactors and possibly other nuclear fuel cycle facilities (including spent fuel)</u>		
2	12	Title of Section 2	“GENERAL GUIDANCE FOR CONCEPT OF THE ACCIDENT MANAGEMENT PROGRAMME”	The former headline in NS-G-2.15 CONCEPT OF THE ACCIDENT MANAGEMENT PROGRAMME is fitting better to the content of the paragraphs listed in Section 2. Thus, the title should be changed back. The phrase “Guidance for a programme” does not make much sense.			Keep	Relevant “concept of the accident management programme” is in the subsection.
1	13	<u>new Para before 2.1</u>	<u>Consideration of design extension conditions in the design of new nuclear power plants or in the enhancement of the design of existing nuclear power plants is an essential component of the defence-in-depth approach used in nuclear safety [2-5]. Requirement 20 in Reference [5] establishes the following requirements on design extension conditions for which accident management programmes are to be developed: A set of design extension conditions shall be derived on the basis of engineering judgement, deterministic assessments and probabilistic assessments for the purpose of further improving the safety of the nuclear power plant by enhancing the plant’s capabilities to withstand, without unacceptable radiological consequences, accidents that are either more severe than design basis accidents or that involve additional failures, and should cover all external events relevant for the site</u>	Nothing similar is said as in Para 2.1 of the previous Safety Guide NS-G-2.15 in relation to methods to be applied to determine those severe accident sequences for which an AMP has to be developed. Therefore, Para 1.3x proposed to be added to DS483 (see comment No. 4) should be adopted here as well, as it defines the frame for AMP for existing plants.		<u>Added “Requirement 20 in Reference [5] establishes the following requirements on design extension conditions for which accident management programmes are to be developed: A set of design extension conditions shall be derived on</u>		To consist with SSR-2/1.

		<p><u>considered, taking into account dependencies between events. These design extension conditions shall be used to identify the additional accident scenarios to be addressed in the planning of practicable provisions for the prevention of such accidents or the mitigation of their consequences if they do occur.</u></p>		<p><u>the basis of engineering judgement, deterministic assessments and probabilistic assessments for the purpose of further improving the safety of the nuclear power plant by enhancing the plant's capabilities to withstand, without unacceptable radiological consequences, accidents that are either more severe than design basis accidents or that involve additional failures, and should cover all external events relevant for the site considered, taking into</u></p>	
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						<u>account dependencies between events.</u>		
1	14	2.1	Paragraph 2.10 in Reference [5] establishes the following requirements on severe accidents and accident management in the design of nuclear power plants which is applicable for the development of accident management programmes in general : “Measures are required to be taken to ensure that the radiological consequences of an accident would be mitigated. Such measures include the provision of safety features and safety systems, the establishment of accident management procedures by the operating organisation and ...”	Paragraph 2.10 of SSR-2/1 Rev. 1 can be applied to AMPs for existing plants if one assumes that “provision of safety features and safety systems” means as well the hardware upgrades and additional permanent installed and mobile systems used typically in AMPs and are further recommended in DS483. The objective “to ensure that the radiological consequences of an accident would be mitigated” fits as well, as it is not so strict as in SSR-2/1 (Para 2.11), in the Safety Fundamentals No. SF-1 (Principle 9).	Added			To clarify the para.
1	15	new Para behind 2.1 (taken from NS-G-2.15)	Consideration shall be given to these severe accident sequences, using a combination of engineering judgement and probabilistic methods, to determine those sequences for which reasonably practicable preventive or mitigatory measures can be identified. Acceptable measures need not involve the application of conservative engineering practices used in setting and evaluating design basis accidents, but rather should be based upon realistic or best estimate assumptions, methods and analytical criteria. On the basis of operational experience, relevant safety analysis and results from safety research, design activities for addressing severe accidents shall take into account the following: (1) Important event sequences (see Para 2.1) that may lead to severe accidents shall be identified using a combination of probabilistic methods, deterministic methods	It is not clear why important information from the previous Safety Guide NS-G-2.15 have been deleted. As long as no better or other reference is available, it shall be contained, as it contains important requirements for AMPs for existing power plants.		Added new para before 3.3	Relevant requirements are changed in the revision of SSR 2/1	

			<p><u>and sound engineering judgement.</u></p> <p><u>(2) These event sequences shall then be reviewed against a set of criteria aimed at determining which severe accidents shall be addressed in the design of accident management programmes.</u></p> <p><u>(3) Potential design changes or procedural changes that could either reduce the likelihood of these selected events, or mitigate their consequences should these selected events occur, shall be evaluated and shall be implemented if reasonably practicable.</u></p> <p><u>(4) Consideration shall be given to the plant's full design capabilities, including the possible use of some systems (i.e. safety and non-safety systems) beyond their originally intended function and anticipated operational states, and the use of additional temporary systems, to return the plant to a controlled state and/or to mitigate the consequences of a severe accident, provided that it can be shown that the systems are able to function in the environmental conditions to be expected.</u></p> <p><u>(5) For multi-unit plants, consideration shall be given to the use of available means and/or support from other units, provided that the safe operation of the other units is not compromised.</u></p>					
2	16	2.2	<p>Requirement 19 on accident management in the operation of nuclear power plants in reference [6] establishes:</p> <p>“The operating organization shall establish, and shall periodically review and as necessary revise an accident management programme”. More detailed requirements are provided in paragraph 5.7 and in several paragraphs associated with Requirement 19.</p>	<p>The first part may stay as it underlines the requirements mentioned above and mentions the regularly updates.</p>	Deleted			To avoid redundancy

2	17	2.3	<p>Reference [7] requires use of the defence in depth philosophy to specify adequate provisions to mitigate the consequences of accidents that exceed design limits and in- p>Paragraph 5.6 in reference [7] requires that the results of the safety assessment shall be used as an input for on-site and off-site emergency response and accident management.</p>	<p>Why DiD should only be implemented for the mitigative domain as mentioned in the text? In case of new plants it is questionable what the phrase “accidents that exceed design limits” means, as severe accidents are covered by special SSC? DiD should be applied in general; therefore, the first part can be deleted if modifications proposed above for Paras 2.1 and 2.2 are accepted. Otherwise one should think about it again.</p>	Deleted			To clarify the para.
2	18	2.4	<p>Paragraph 4.7 <u>5.2</u> in reference [40] <u>[8]</u> dealing with minimization of consequences of any nuclear or radiological emergency on peoples’ health, property and the environment requires that the transition from normal <u>operations</u> to <u>emergency</u> operations <u>under emergency conditions on the site</u> shall be clearly defined <u>specified</u> and <u>shall</u> be effectively made without jeopardizing safety. The responsibilities of emergency staff who would be on the site in an emergency shall be designated as part of the transition. It is also required to ensure that the transition to emergency response and the performance of initial response actions do not impair the ability of the operational staff (such as the control room staff) to follow the procedures necessary for safe operations and for taking accident management actions. Hence the need to properly integrate accident management procedures/guidelines and emergency preparedness and response (EPR) at the development stage.</p>	<p>The Safety Requirements GS-R-2 need to be replaced by the successor document GSR Part 7 (DS457, revision of GS-R-2). The final version of DS457 has been endorsed by the CSS in November 2014 and the Board of Governors in March 2015. GSR Part 7 will be established as an IAEA Safety Standard before DS483 is finalized, forcing the deletion of all links to GS-R-2 from the document. The proposed changes in wording reflect the statement established in Para 5.2 of GSR Part 7.</p>	Replaced			To correct the references and to clarify the para.
2	19	2.5	<p>An accident management programme should be developed and implemented for all plants irrespective of the core damage frequency and fission product release frequency</p>	<p>In accordance with the modifications proposed above the text here should be modified for new plants. There the accident management provisions are</p>	Added			To clarify the para.

			calculated for the plant, including . For new plants equipped with dedicated systems for prevention and mitigation of severe accidents already in the design, appropriate procedures for accident management should be developed [5].	not necessarily named AMP.				
2	20	2.27 should be behind 2.5	The accident management programme should cover all external events relevant for the site considered, taking into account dependencies between events ¹⁴ , and all modes of operation. It should also consider that external events could result in significant damage to the infrastructure on-site or off-site. ¹⁴ For example, a seismic event could result in a dam failure upstream a river site, or in a tsunami for some sea sites	In accordance with the modifications proposed in DS483, the text of Para 2.27 should be moved to this place, as it contains a basic requirement for an AMP.	Reallocated			To clarify the para.
2	21	2.6	Accident management programme guidance should be developed and maintained consistent with the plant design and its current configuration.	Probably an AMP is meant as the definition of accident management guidance follows later by Para 2.13.	Replaced			To correct the typo error
2	22	2.7 new Para behind 2.12	Accident management guidance should assist plant personnel to prioritize, monitor, and execute actions in the working conditions that may exist during accidents including those resulting from extreme external events.	Para 2.12 defines “accident management guidance”. Para 2.7 should be moved behind Para 2.12.	Reallocated			To locate the right position
3	23	Foot-note No. 4	Strategies are global orientations contemplated for reaching objectives. For example, a strategy for preventing containment by-pass and thereby maintaining containment /Cconfinement integrity in PWRs is to fill the steam generators with water for preventing Steam Generator Tube Ruptures resulting from tube thermal creep. ...	A clarification of the footnote would make it easier to understand why feeding steam generator prevents containment failure.	Added			To clarify the statement
1	24	2.9	Multiple strategies should be developed to achieve the accident management objectives,	Proposal of consistent text with new Para 1.4. If our comment No. 5 will	Added			To clarify the para,

			<p>including:</p> <ul style="list-style-type: none"> • Preventing severe fuel damage <u>by termination of accident progression, or, delaying the time at which significant fuel degradation happens</u>; • Terminating the progress of fuel damage once it has started; • Maintaining the integrity of the containment <u>or any other confinement of fuel</u> and preventing containment by-pass; • <u>Mitigating</u> Minimizing releases of radioactive material, including releases from any location of fuel source of radioactive material outside containment⁵; and • Achieving a long term safe stable state. <p>⁵For example, from the spent fuel pool</p>	<p>be accepted, this must be considered here as well. Footnote No. 5 would then no longer be needed and can be deleted.</p>				
1	25	2.12	<p>Appropriate guidance, in the form of procedures (<u>called Emergency Operating Procedures – EOP and preferably to be used in the preventive domain of accident management</u>) and guidelines (<u>called Severe Accident Management Guidelines – SAMG and preferably to be used in the mitigative domain</u>), should be developed from the strategies for the personnel responsible for executing the measures for accident management.</p>	<p>In Paras 2.33 and 2.34 the terms EOP and SAMG are defined. As the difference between both is important, it is recommended to include these definitions already here where both parts are mentioned first.</p>	Added			To clarify the para.
1	26	2.13	<p>When developing guidance on accident management, consideration should be given to the full design capabilities of the plant, using safety and non-safety systems <u>and including possible plant modifications and the use of mobile equipment. Care should be taken if</u> the possible use of some systems beyond their originally <u>intended</u> function and anticipated operating conditions and possibly outside their design basis <u>is</u></p>	<p>Para 2.13 should be completed by the use of additional hardware and use of mobile systems. The use of systems outside its design is recommended only in SAMG and care must be taken. This should be made more precise.</p> <p>The Footnote No. 7 should be deleted, as it contains wrong information. Unit</p>	Added			To clarify the para.

			<p>foreseen in the guidance on accident management. Specific consideration should also be given to maintaining conditions needed for continued operation of equipment ultimately necessary to prevent large or early radioactive releases⁷</p> <p>⁷For example, at Fukushima Daiichi units 2, 3 and 4, partial depressurization of the containment allowed operation of the RCIC (Reactor Core Isolation Cooling) system over a longer period than would have been anticipated under fully depressurized conditions.</p>	<p>4 was out of operation at the time of the accident, so that RCIC was neither used nor needed. In units 2 and 3, the containments have neither been partially depressurized to allow RCIC operation nor completely. It is true that probably RCIC failed in unit 2 due to high containment pressure signalisation after the DC power was set back. The footnote is not needed to underline the importance of the last sentence in Para 2.13.</p>				
2	27	2.14	<p>In view of the uncertainties involved in severe accidents accident management guidance, including guidance for management of severe accidents, should be developed for all physically identifiable challenge mechanisms for which the development of accident management guidance is practicable in order to minimize the impact of severe accidents on public health and safety, for which the development of such guidance is practicable. Accident management guidance should be developed irrespective of the probability of occurrence of the challenges.</p>	<p>Compared to the former Para 2.12, which is now Para 2.14, the order of parts of the sentence has been modified, which makes its less understandable.</p>	Added			To clarify the para.
2	28	2.15	<p>Accident management guidance should also consider (where deemed necessary) that in case of extreme external events⁸, there may be extensive infrastructure damage, so that offsite resources are not readily available, including human resources and/or communication, electrical power, compressed air, water and fuel.</p>	<p>It should be made clear that not in any case extreme external events are to be considered in accident management guidance. Not all possible extreme external events may lead in consequence to a severe accident. Former Para 2.27 (now proposed to be moved behind Para 2.5) provides more details.</p>	Added			To clarify the para.
2	29	2.26 to be	<p>In the severe Accident management guidance consideration should also be</p>	<p>The middle part can be deleted as it is a basic requirement that AMP should</p>	Replaced			To clarify the para.

		<p>placed behind 2.15</p> <p>considered given to any specific challenges posed by shutdown plant configurations and large scale maintenance¹³. The potential damage of fuel both in the reactor vessel and in the spent fuel pool, and dry storage if appropriate, should also be considered in the accident management guidance. As large scale maintenance is frequently carried out during planned shutdown states, a high priority of accident management guidance should be the safety of the workforce.</p> <p>¹³ Such as an open containment equipment hatch.</p>	<p>be made for all plant states and locations of the fuel.</p>					
1	30	2.17	<p>“The licensee utility should have full responsibility for implementation of the accident management guidance and take steps to ensure that roles of the different members of the on-site emergency response organization involved in accident management have been clearly defined, allocated and coordinated.”</p>	<p>It is proposed to replace ‘utility’ by ‘licensee’ to be in line with Para 3.5 of the Safety Fundamentals SF-1: <i>“The licensee retains the prime responsibility for safety throughout the lifetime of facilities and activities, and this responsibility cannot be delegated.”</i></p> <p>As stated in GSR Part 7, there are usually various emergency response organizations (on-site and off-site) at local, regional and national levels. We assume Para 2.17 refers to the on-site emergency response organization. Regarding the national coordinating mechanism, Para 4.7 of GSR Part 7 states: <i>“The government shall ensure that all roles and responsibilities for preparedness and response for a nuclear or radiological emergency are clearly allocated in advance among operating organizations, the regulatory body and response</i></p>	Replaced			To consistency with SF-1 and PSR Part 7.

				<i>organizations.</i> ”				
2	31	2.18 <u>and</u> <u>2.21</u>	Adequate staffing and working conditions should be ensured for managing accidents, including those resulting from extreme external events. <u>Accident management should consider that some rare events¹⁰ may result in similar challenges to all units on the site. Therefore</u> plans for defining staffing needs should take into account situations where several units on the same site have been affected simultaneously and some plant personnel have been temporarily or permanently incapacitated. Contingency plans should be prepared to provide alternate personnel to fill the corresponding positions in case of unavailability of staff.	Para 2.21 should be included here as both issues belong to each other.	Combined 2.18 and 2.21			To improve the text
2	32	2.22 <u>and</u> <u>2.24</u>	The approach in accident management should be, as far as feasible, based on either directly measurable plant parameters or information derived from simple calculations ¹¹ , <u>and Accident management should consider the loss of indication of key plant parameters.</u>	Para 2.24 should be included here as both issues belong to each other.	Combined 2.18 and 2.21			To improve the text
2	33	2.25	Development of accident management guidance should be based on best estimate analysis of the physical response of the plant. In the accident management guidance consideration should be given to uncertainties in knowledge about the timing and magnitude of phenomena that might occur in the progression of the accident. Hence, <u>mitigatory accident management</u> actions should be initiated at parameter levels and at a time that gives sufficient confidence that the <u>goal protection-intended to be achieved</u> by carrying out the action will be <u>reached achieved</u> ¹² . ¹² For example, venting the containment,	The text should be made more precise. It is not only the case that mitigative actions should be taken in accordance with identified parameters, this holds true even more for preventive actions. There the success of the actions is easier to be predetermined so that criteria are better to be specified. Measurement signals are typically only available in the preventive domain. The Footnote No. 12 should be deleted. The example provided does not make much sense. If containment venting is initiated earlier than earlier	Replaced			To improve the text

			when physically possible, might be initiated at moderate containment pressure to accommodate pressure increases resulting from the generation of non-condensibles or from combustible gases burns or recombination to give further confidence that containment structural integrity will not be lost.	releases of radioactive materials are the consequence. This must be well prepared in advance. Combustible gas burns result only in a short pressure pike which cannot be influenced by venting, especially as the occurrence of burns is typically not known beforehand.				
2	34	2.28	Design features important for the prevention or mitigation of severe accidents should be identified and evaluated. Accordingly, existing equipment and/or instrumentation should be upgraded or new equipment and/or instrumentation should be added, if necessary or beneficial ¹⁵ for <u>the development of an improving</u> accident management programme to provide an efficient means of reducing risks in an appreciable way or to an acceptable level. ¹⁵ Equipment may not be necessary, in the strict sense of the word, but can be very useful for implementing the accident management. For example, passive autocatalytic recombiners remove uncertainties on hydrogen burns.	Here the development of an AMP is meant not only its improvement. The second part of the footnote is not a good example respectively badly formulated. It should be removed.	Replaced			To clarify the para,
2	35	2.30	Where existing equipment or instrumentation is upgraded or otherwise to be used outside its previously considered design basis range, the accident management guidance for the use of such equipment should <u>be developed</u> or updated accordingly. Operating procedures or guidelines should be developed for use of the upgraded equipment or instrumentation.	Simplification of para recommended. The term accident management guidance includes both procedures and guidelines (see Para 2.12).	Replaced	design range is design basis		To improve the wording.
2	36	2.33	“... EOPs should cover both design basis accidents and design extension conditions, but are typically limited to actions taken prior to fuel damage. Further details on	The Safety Requirements GS-R-2 need to be replaced by the successor document GSR Part 7 (DS457, revision of GS-R-2). The final version of	Corrected relevant references			To correct the references

			EOPs may be found in Refs [8, 10 , 11].”	DS457 has been endorsed by the CSS in November 2014 and the Board of Governors in March 2015. GSR Part 7 will be established as an IAEA Safety Standard before DS483 is finalized, forcing the deletion of all links to GS-R-2 from the document. EOPs are addressed in Para 5.25 of GSR Part 7.				
2	37	2.36	The guidance for the mitigatory domain should be presented in the appropriate form, including guidelines, procedures , manuals or handbooks. The term guideline here is used to describe a set of instructions <u>strategies and measures</u> that describe the tasks to be executed in the plant, but which are still less strict and prescriptive than the procedures found in the EOPs, i.e. used in the preventive domain.	In Para 2.12 it was defined what is meant by accident management guidance: development of procedures (prevention) and guidelines (mitigation). These definition should always been used. Procedures for mitigative domain should not been used.	Replaced			To clarify the para.
2	38	2.40	For extreme external events that result in normal accident management capabilities being unavailable such as loss of the command and control structure, support procedures may be developed to provide guidance on using instrumentation and equipment to cope with these conditions ²⁰ . In this case, command and control is re-established and clearly identified, and the guidance includes conditions for use of these support procedures. ²⁰ For example, use of portable equipment as described in NEI 12-06, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide”	It is not clear what is meant by normal accident management capabilities? Does such belong to design basis events? How can the command and control structure been lost? Does this mean that all personnel died? The intention should be clearly described. If this should be a requirement (a general one), than it should not be placed under the headline FORMS OF ACCIDENT MANAGEMENT GUIDANCE . No proposal for modification could be made as the text is not clear.	Reworded; “For situation that result in normal accident management capabilities being unavailable such as loss of the command and control structure, support procedures may be developed to provide			

					guidance on using instrumentation and equipment to cope with these conditions . The severe accident guidance should include conditions for use of these support procedures.”			
2	39	Foot-note No. 22 to 2.42	“Hardcopies should also be made available in all locations used as backups in case of accidents caused by extreme external events accidents ”	Clarification. The term ‘extreme external events accidents’ does not exist.	Correct			To correct the typo error
2	40	2.45	“The roles assigned to the members of the on-site emergency response organization may be different in the preventive and mitigatory domains, and, where this is the case, transitions of responsibility and authority should be clearly defined.”	As stated in GSR Part 7, there are usually various emergency response organizations (on-site and off-site) at local, regional and national levels. It is assumed that Para 2.45 refers to the on-site emergency response organization.	Added			To clarify the statement
2	41	2.47	“Appropriate levels of training should be provided to members of the on-site emergency response organization; the training should be commensurate with their responsibilities in the preventive and mitigatory domains.”	As stated in GSR Part 7, there are usually various emergency response organizations (on-site and off-site) at local, regional and national levels. It is assumed that Para 2.47 refers to the on-site emergency response organization.	Added			To clarify the statement
2	42	3.2	The preventive accident management procedures/guidelines strategies and measures should address the full spectrum of events i.e. all events considered on the	In Para 2.12 it was defined what is meant by accident management guidance: development of procedures (prevention) and guidelines	Replaced			To clarify the para.

			<p>basis of credible initiating events, and possible complications during the evolution of the event that could be caused by additional hardware failures, human errors and/or <u>relevant</u> extreme external events.</p>	<p>(mitigation). These definition should always been used. Guidelines for preventive domain should not been foreseen.</p> <p>It is not clear why here “and/or” is mentioned – “or” should be deleted. Further consideration of “human errors” should be deleted, unless a method is proposed to what extent such errors should be considered.</p>				
2	43	3.3	<p>For determination of the full spectrum of events²⁶, useful guidance can be obtained from the probabilistic safety assessment (PSA) level 1 (if available), from expert judgment or similar studies from other plants, and operating experience from the plant and other plants. The selection of events should be sufficiently comprehensive to provide a basis for guidance for the plant personnel in any identified situation (<u>compare also with Para 1.3x</u>).</p> <p>²⁶ External events PSA, if available, can be useful in providing insights to the full spectrum of events to be considered.</p>	<p>The phrase “can be obtained” already assumes that the PSA study is available; this should not explicitly be mentioned.</p> <p>Reference could be made to Para 1.3x which was proposed to be added and defines DEC and their determination (see comment No. 4).</p> <p>Footnote No. 26 can be deleted since consideration of external events is addressed in Para 3.4.</p>	Deleted	Keep foot note because delete 3.4		To delete the redundancy
2	44	3.6	<p>The accident management in the mitigatory domain addresses challenges caused by significant reactor fuel damage (in the core, or the spent fuel pool or any other location where fuel is stored); i.e. it deals with the severe accidents. Severe Accident Mmanagement guidance should address the full spectrum of challenges to fission product barriers, including those arising from multiple hardware failures, human errors and/or extreme external events, and possible physical phenomena that may occur during the evolution of a severe accident²⁹. In this process, even highly improbable</p>	<p>It is not clear why here “and/or” is mentioned – “or” should be deleted. Further consideration of “human errors” should be deleted, unless a method is proposed to what extent such errors should be considered. In Para 2.9 (see comment No. 24) any location of fuel was mentioned to be covered by AMP; text should be extended accordingly.</p> <p>Reference could be made to Para 1.3x which was proposed to be added and defines DEC and their determination</p>	Deleted			To clarify the para.

			failures, abnormal functioning of equipment and human errors should be considered (compare with Para 1.3x) .	(see comment No. 4).				
2	45	3.7	For determination of the full spectrum of challenge mechanisms, useful guidance can be obtained from the probabilistic safety assessment (PSA) Level 2 (if available), or similar studies from other plants, ...	The phrase “can be obtained” already assumes that the PSA study is available; it should not be explicitly mentioned.	Deleted			To delete the redundancy
2	46	3.9	The development of an accident management programme should consider the following: <ul style="list-style-type: none"> • Available or necessary hardware provisions for execution of accident management strategies; • The means of obtaining information on the plant status, and the role of instrumentation therein, ... 	Hardware upgrades or implementation of new hardware are typically also done for AMP implementation in existing plants. If “available” should be added to the original sentence, also additional necessary hardware should be mentioned.	Added			To clarify the para.
2	47	3.16	After the If an accident management guidance programme has been completed earlier , it should be assessed whether all important challenges to fission product boundaries have been addressed, including those resulting from extreme external events.	This should be modified; as it is already contained e.g. in Para 3.4. It should not be a separate issue for the development of an AMP. The sentence should be modified for a case that an AMP exists and its extension is foreseen to include external events.	Replaced			To clarify the para.
2	48	3.19	Last sentence: “Vulnerabilities resulting from the failure of command and control due to loss of control room or impairment of the capability to set up the on-site Emergency Response Organization should also be addressed.”	As stated in GSR Part 7, there are usually various emergency response organizations (on-site and off-site) at local, regional and national levels. It is assumed that Para 3.19 refers to the on-site emergency response organization.	Added			To clarify the statement
1	49	3.20	The vulnerabilities to extreme external events that can impact the use of accident mitigation management features, both permanently installed as well as portable, should be identified. It should be investigated how specific external events can	The sentence is true for all accident management features, not only for mitigative ones. It should be made clear that such an investigation is not necessary for any	Replaced	Make footnote “ The investigation should be done ”		To clarify the para.

			interfere with the use of accident mitigation management features. <u>The investigation should be done especially for such cases where extreme external events could lead to design extension conditions which require the use of accident management measures.</u>	extreme external event. Only such events are important which could lead to DEC and use of AM.		<u>especially for such cases where extreme external events could lead to design extension conditions which require the use of accident management measures”</u>		
1	50	3.29	In the mitigatory domain, strategies should be developed with the objectives of: <ul style="list-style-type: none"> • Terminating the progress of fuel degradation; • Maintaining the integrity of the containment <u>or any other confinement of fuel</u> and preventing containment by-pass; • <u>Mitigating Minimizing</u> releases of radioactive material <u>from any location of fuel</u>; and • Achieving a long term safe stable state. 	Proposal of consistent text with new Para 1.4. If our comment No. 5 will be accepted, this must be considered here as well.	Added			To clarify the para.
2	51	3.62	Recovery of failed equipment and/or, recovery from erroneous operator actions should be factored into accident management guidance. The time to recover failed equipment or to implement/connect portable equipment may be outside the time window to prevent core damage. If this is the case, an earlier transition to the mitigatory domain can be decided.	Consideration of “human errors” should be deleted, unless a method is proposed to what extent such errors should be considered. It was proposed to be deleted as well in Paras 3.2 and 3.6 (see comments No. 42 and 44).	Deleted			To clarify the para.
1	52	3.64 <u>should be placed before</u>	When containment venting is possible, the accident management programme should provide guidance on its use to prevent uncontrolled loss of containment integrity and to avoid <u>mitigate the</u> releases of	The first sentence should be made more precise. Does it mean that even unfiltered containment venting is tolerated as part of an AMP? Should the prevention of radionuclide	Replaced	Keep “causing long-term off-site contaminatio		

		3.79	radionuclides causing long-term off-site contamination. <u>Therefore the containment venting should always be filtered.</u> Guidance should be provided for performing venting under conditions such as loss of power and high radiation levels and high temperatures in areas where vent valves are located (if local access is required).	releases causing long-term off-site contamination be a general (new) objective of an AMP, it should be mentioned right in the beginning of the document. Filtered containment venting should be requested in any case.		n” which is reflected of Vienna Declaration <u>Many MSs are using hardened vent to prevent uncontrolled loss of containment integrity</u>	
2	53	3.88	1 st and 2 nd sentence: “If structures, systems, and components (SSCs) important to safety are shared between two or more nuclear power reactors units , it should be demonstrated that all the safety recommendations and considerations should be met for each reactor unit . In the event of a design extension conditions involving a reactor unit that shares SSCs with other reactors units , it should be demonstrated that an orderly shutdown of reactors and a safe shutdown are is achievable in the other reactor(s) unit(s). ”	It is proposed to replace ‘reactor(s)’ by ‘unit(s)’ to be in line with the wording in other paragraphs providing guidance on multi-unit sites (i.e. Paras 3.69–3.70, 3.86–3.87, and 3.133). 2 nd sentence: Streamlining of wording without loss of information. What is the difference between ‘orderly shutdown’ and ‘safe shutdown’?	Replaced		To improve the wording
3	54	Foot-note No. 67 to 3.93	“Adequate information on additional means can be found in Ref. [13] Safety Report Series No 32, Implementation for Accident-Management Programme for Nuclear power Plants. ”	The Safety Reports Series No. 32 is included as Ref. [13] in the list of references.	Deleted		To avoid redundancy
3	55	3.102	“A highly reliable communication network between the different locations of the emergency response organizations (ERO) should be used. Guidance should be put in place for measures to be taken if off-site communication fails and only the part of the on-site emergency response organization	As stated in GSR Part 7, there are usually various emergency response organizations (on-site and off-site) at local, regional and national levels. The abbreviation ‘ERO’ is not used subsequently in the document. Thus,	Corrected		To improve the text

			located at the plant site remains functional in case of failure of the primary communications systems, period.”	it can be deleted here.				
3	56	3.107	2 nd sentence: “The <u>on-site</u> emergency response organization could include elements as depicted in Fig. 2.”	As stated in GSR Part 7, there are usually various emergency response organizations (on-site and off-site) at local, regional and national levels. Figure 2 illustrates the structure of the on-site emergency response organization.	Added			To clarify the text
2	57	3.109	“Ref. [8] in part requires that the transition from normal plant operation to accident conditions during an emergency be clearly defined and be effectively made without jeopardizing safety. The responsibilities of everyone required to be on the site in an emergency should be designated as part of the transition. It is also required to ensure that the transition to emergency response and the performance of initial response actions do not impair the ability of the operational staff (such as the control room staff) to follow the procedures necessary for safe operations and for taking accident management actions.”	Para 2.4 (first three sentences) and Para 3.109 are very similar in text. The main difference is that Para 2.4 refers to GS-R-2 while Para 3.109 refers to the successor document GSR Part 7 (DS457, revision of GS-R-2). In our opinion, Para 2.4 fits better into Section 2 which presents general, high-level recommendations for an accident management programme. For this reason, and in order to avoid unnecessary duplications in the document, we recommend <ul style="list-style-type: none"> to delete Para 3.109 in Section 3 and to retain Para 2.4 in Section 2, to incorporate the modifications proposed in our comment on Para 2.4 due to the replacement of GS-R-2 by GSR Part 7 (see comment No. 18). 	Deleted			To be redundancy with 2.4
2	58	3.125	2 nd sentence: “The technical support centre should provide technical support to the control room staff, and, where applicable, to other parts of the <u>off-site</u> emergency response organizations by performing evaluations and recommending mitigative actions to the decision making authority.”	As stated in GSR Part 7, there are usually various emergency response organizations (on-site and off-site) at local, regional and national levels. The example provided in Footnote No. 80 to Para 3.125 relates to the off-site emergency response organization(s).	Added			To clarify the text

2	59	3.128	1 st and 2 nd sentence: “Rules for information exchange between the various teams of the <u>various</u> emergency response organizations should be defined. The mechanisms for ensuring the flow of information between the technical support centre and the control room as well as from the technical support centre to other parts of the emergency response organizations, including those responsible for the execution of on-site and off-site emergency plans, should be specified.”	As stated in GSR Part 7, there are usually various emergency response organizations (on-site and off-site) at local, regional and national levels. Depending on national laws and regulations, responsibilities for the execution of on-site and off-site emergency plans, respectively, may rest with different emergency response organizations.	Corrected			To improve the text
3	60	Foot-note No. 87 to heading before 3.134	“More detailed information <u>is provided</u> in <u>Ref. [13] Safety Report Series N.32-Implementation of Accident Management Programmes in Nuclear Power Plants”.</u>	The Safety Reports Series No. 32 is included as Ref. [13] in the list of references.	Deleted			To delete the redundancy
3	61	3.137	2 nd sentence: “... for practical implementation of accident management measures, in particular in case of an extreme <u>external</u> event, including seismically induced fires and floods.”	Clarification.	Added			To clarify the text
3	62	Foot-note No. 91 to 3.139	“This includes independent review in <u>Paras Sections 6.3-6.6</u> of <u>Ref. [15] IAEA Safety Standards Series No GS-R-3</u> ”	Paras 6.3 to 6.6 in the subsection “Independent assessment” of the Safety Requirements GS-R-3 are relevant here. GS-R-3 is included as Ref. [15] in the list of references.	Deleted			To delete the redundancy
2	63	3.147	1 st sentence: “Exercises and drills should be based on scenarios that require application of a substantial portion of the overall accident management programme in concert with emergency response and in realistic conditions characteristic of those that would be encountered in a severe emergency <u>accident</u> .”	Clarification. The term ‘emergency’ is defined in GSR Part 7 as follows: “ <i>A non-routine situation or event that necessitates prompt action, primarily to mitigate a hazard or adverse consequences for human health and safety, quality of life, property or the environment.</i> ” This definition cannot be graded. We	Corrected			To correct the typo error

				assume Para 3.147 refers to conditions characteristic of those that would be encountered in a severe accident.				
3	64	Foot-note No. 96 to 3.153	“Additional guidance for exercises/drills is presented in Ref. [13] , Safety Report Series No. 32, Implementation of accident management programme in nuclear power plants. ”	The Safety Reports Series No. 32 is included as Ref. [13] in the list of references.	Deleted			To delete the redundancy
2	65	3.160 to 3.174	SUPPORTING ANALYSES FOR DEVELOPMENT OF ACCIDENT MANAGEMENT PROGRAMMES	Headline should be changed. It is no longer only supporting analysis. The chapter is of high importance. It should be move up just before chapter PERSONNEL STAFFING AND NEEDS.	Replaced			To clarify the title
2	66	3.175	1 st sentence: “Development of an accident management programme should be the responsibility of the operating organization and follow the applicable IAEA safety requirements and guidance on this subject [15, 19 , 21].” Please add the Safety Guide GS-G-3.5 to the list of references: “ [21] INTERNATIONAL ATOMIC ENERGY AGENCY, The Management System for Nuclear Installations, IAEA Safety Standards Series No. GS-G-3.5, IAEA, Vienna (2009). ”	GS-R-3 (or, in the near future, GSR Part 2) establishes the requirements on management systems while GS-G-3.1 and GS-G-3.5 provide recommendations and guidance on how to meet these requirements. In this context, Para 3.175 refers to “applicable IAEA safety requirements and guidance”, but omits the references to the relevant Safety Guides GS-G-3.1 and GS-G-3.5.	Added			To add relevant references
2	67	Title of Section 4	“EXECUTION OF PROCEDURES AND GUIDELINES SAMGs ”	Title should be modified to contain both – procedures and guidelines.	Replaced			To clarify the title
2	68	4.8	“Final decision making rests with the person of the on-site Emergency Response Organisation responsible for the decision making.”	As stated in GSR Part 7, there are usually various emergency response organizations (on-site and off-site) at local, regional and national levels. It is assumed that Para 4.8 refers to the on-site emergency response organi-	Added			To clarify the text

				zation.				
3	69	General	“... extreme external hazards events ...”	The wording in DS483 should be made consistent. In some paragraphs, the terms “hazard” is used instead of “event” which is typically used. This should be corrected throughout the document.	Replaced			To correct the word
3	70	Ref. [9]	Note: The Safety Guide NS-G-1.10 “Design of Reactor Containment Systems for NPPs” is not referred to in the text of the document.	All those publications which have been consulted and served as a basis for developing DS483 should be quoted systemically in the text.	Deleted			DS482 is in revision process
3	71	Ref. [13]	“... Implementation of Accident Management Programmes in Nuclear Power Plants, Safety Reports Series No. 32, IAEA, Vienna (2004).”	Editorial correction of the publication title.	Corrected			To correct the typo error
3	72	Ref. [14]	“... Guidelines for the Review of Accident Management Programmes in Nuclear Power Plants, IAEA Services Series No. 9, IAEA, Vienna (2003).”	Editorial correction of the publication title.	Corrected			To correct the typo error
2	73	Annex II	In addition, to keep abreast with the international community, the development of SAMGs has been started in 2010, and full completion is contemplated for the was fully completed end of 2014. The Severe Accident Management Manual (SAM-M) for PWRs and BWRs includes: <ul style="list-style-type: none"> • The diagnosis of the plant (damage) state, • Related strategies for mitigating the consequences of a Severe Accident • Detail sheets for all measures within the strategies. • Links to Existing and potential new mitigative EOPs that are relevant for mitigative strategies. ... In a severe accident, the plant state must be diagnosed on the basis of the available instrumentation. In currently operating plants, there is no dedicated instrumentation	Modifications of the text are proposed as the SAMGs are now implemented in PWRs and BWRs in Germany. The modified text is more in accordance with the current status and was proposed by the utilities.	Added			To add new information

		<p>that enables <u>for</u> diagnosing containment status, or the extent of core damage, in a simple way.</p> <p>... for this purpose:</p> <ul style="list-style-type: none"> • Core state “A” characterizes a low degradation level (rod-like geometry) • Core state “B” characterizes ongoing core degradation until RPV failure • Core state “C” means the RPV has failed. <p><u>It should be noted that core states A and B are practically indistinguishable by means of measurements. Therefore strategies are implemented to apply for both states (“A/B-state”). However, strategies are robust in a sense that no harmful consequences will arise from using A/B-strategies when RPV failure is not detected immediately (core state “C”).</u></p> <p>Characterization of confinement status or identification of the containment damage state is also made using a selection flowchart. For German PWRs, six representative confinement states have been defined:</p> <ul style="list-style-type: none"> • The containment is intact and there is no <u>obvious</u> risk of losing containment integrity; • Containment integrity is challenged; <p>...</p> <p>Based on these plant states, dedicated strategies are implemented to prioritize the performance of adequate mitigative measures. Although parallel implementation <u>execution</u> of several measures is not excluded, performance of previously implemented <u>initiated</u> more efficient measures (measures with a higher level of priority) must not be jeopardized. It is also recommended <u>In addition, postponing</u> implementation <u>initiation</u> of measures</p>					
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		<p>having a lower level of priority until success of previously implemented ones has been recognized is not recommended.</p> <p>... To recognize any transition between different plant states, the ERT regularly checks the parameters that define the plant damage states for confirming whether implemented actions work satisfactorily or not. However, judgment on whether such actions work satisfactorily is not based on reaching success criteria. <u>When applicable, criteria to terminate certain measures or effectiveness conditions and criteria are given in the detail sheets.</u> In case of change of plant damage state, implementation of the current strategy must be stopped and the execution of the new strategy starts from the top. <u>However, all measures currently in execution will not be terminated until termination is explicitly demanded in the new strategy.</u></p> <p>...</p> <ul style="list-style-type: none">• Monitoring parameters that allow confirming that the RPV has not failed, minimum grace period provided by deterministic analyzes before RPV failure and trending parameters that could allow characterization of RPV failure are also used. For cases where the differentiation between different core states cannot be done using existing instrumentation only, it should be possible to use alternate means, such as <u>computational aids</u>. a dedicated post-accident sampling system for monitoring carbon monoxide and carbon dioxide that are indicators of Molten Core Concrete Interaction (MCCI), and, consequently, of RPV failure. This possibility is currently discussed with				
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			<p>German utilities:</p> <ul style="list-style-type: none"> • Water injection into the Reactor cavity (via RCS) for preventing or limiting basemat attack and scrubbing fission products in case of RPV failure, ... 				
2	74	General	CONTRIBUTORS TO DRAFTING AND REVIEW	The Technical Officer should eliminate the persons who have not contributed to the drafting and review of DS483 or better distinguish between those who have contributed to NS-G-2.15 and SRS No. 32 and the ones who developed the latest version of DS483. Many of us have not been involved in the latest development.	Deleted		Deleted

Draft Safety Guide DS483 “Accident Management Programmes for Nuclear Power Plants” (Version dated 9 April 2015)
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Japan

COMMENTS BY REVIEWER:				RESOLUTION			
Reviewer: Japan NUSSC member Country/Organization: Japan/NRA		Page 1 of Date: 22 MAY 2015		Accepted	Accepted, but modified as follows	Rejected	Reason for modify/ reject.
No.	Para/Line No.	Proposed new text	Reason				
1.	1.1/3	--- are kept within authorized <u>acceptable</u> limits [1].	Be consistent with terminologies used in SSR-2/1.	Replaced			Acceptable limit. A limit acceptable to the regulatory body. The term authorized limit should be used to refer to limits on doses or risks, or on releases of radionuclides, which are acceptable to the regulatory body on the assumption that they are likely to occur.
2.	1.4/3	- To prevent the escalation <u>progression</u> of the event into a severe accident		Replaced			To clarify the statement
3.	1.10/2	... and new light water reactors” should be replaced to “ <u>water cooled reactors</u>	Type of reactors: PHWRs are included the same scope as both SSR-2/1 and SSR-2/2.	Replaced			To clarify the statement
4.	1.11 Table 1, and others	Technical Support Centre <u>Emergency Response Facility</u>	Be consistent with terminologies in DS462 (Revision of SSR-2/2, SSR-2/1 and GSR Part 4).		Technical Support Centre (or emergency response facility)		To consistence with relevant safety requirements SSR-2/1, SSR-2/2 and GSR Part 4.
5.	2.7/3	... extreme external events <u>more severe than external natural hazards.</u>	Be consistent with terminologies in DS462 (Revision of SSR-2/2, SSR-2/1 and GSR Part 4).		extreme external events which are more severe than external		To consistence with relevant safety requirements SSR-2/1, SSR-2/2 and GSR Part 4

COMMENTS BY REVIEWER:				RESOLUTION			
Reviewer: Japan NUSSC member		Page 1 of					
Country/Organization: Japan/NRA		Date: 22 MAY 2015					
No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./ reject.
					natural hazards.		
6.	2.10/6, and others	... use of portable and mobile equipment <u>non-permanent equipment</u>	Be consistent with terminologies in DS462 (Revision of SSR-2/2, SSR-2/1 and GSR Part 4).	Replaced			To consistence with relevant safety requirements SSR-2/1, SSR-2/2 and GSR Part 4
7.	2.13/2	... using safety and non-safety systems <u>items important to safety and items not important to safety</u>	Be consistent with terminologies in DS462 (Revision of SSR-2/2, SSR-2/1 and GSR Part 4).	Replaced			To consistence with relevant safety requirements SSR-2/1, SSR-2/2 and GSR Part 4
8.	2.13/6 footnote 7	Delete " <u>unit 4</u> ".	The unit 4 that was not operating at that time.	Corrected			To correct typo error.
9.	2.17/1	The utility licensee ...	Better wordings.	Replaced			To consistence with IAEA Safety Glossary
10.	2.18/1	Adequate staffing and living conditions ... <u>Competent staffing and habitability</u>	Better wordings.	Replaced			Editorial improve
11.	2.18/3	... where several <u>multi</u> -units ...	Editorials.	Replaced			Editorial improve
12.	2.26/3	The potential damage of fuel both in the reactor vessel core and	Editorials.	Replaced			Editorial improve
13.	2.28/1	Design features important <u>Items important to safety</u> ...	Be consistent with terminologies in DS462 (Revision of SSR-2/2, SSR-2/1 and GSR Part 4).	Replaced			To consistence with relevant safety requirements SSR-2/1, SSR-2/2 and GSR Part 4
14.	2.32/1, and others	New equipment, either fixed <u>permanent</u> , or portable <u>non-permanent</u> that is ...	Be consistent with terminologies in DS462 (Revision of SSR-2/2, SSR-2/1 and GSR Part 4).	Replaced			To consistence with relevant safety requirements SSR-2/1, SSR-2/2 and GSR Part 4
15.	3.26/4	•working in poorly lit <u>light</u> ...	Editorials.	corrected			To correct typo error

COMMENTS BY REVIEWER:				RESOLUTION			
Reviewer: Japan NUSSC member Country/Organization: Japan/NRA		Page 1 of Date: 22 MAY 2015					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./ reject.
16.	Title of 3.107	INTERFACES WITH EMERGENCY PREPAREDNESS, RESPONSIBILITIES AND LINES OF AUTHORIZATION <u>AND INTERFACES WITH EMERGENCY PREPAREDNESS</u>	In taking into account the description of the current version NS-G-2.15, for ease understanding, the responsibilities and lines of authorization should be described at the first stage.	Replaced			To allocate
17.	3.112	3.112 3.107 Responsibilities and authorities for implementation of certain accident management action with a potentially significant impact ⁷³ should be established in the entire emergency response organization. <u>The emergency response organization could include elements as depicted in Figure. 2.</u> The emergency director (or other person with clearly assigned decision-making authority) should have the authority to take any necessary actions to mitigate the event including venting containment or injecting low quality water into the reactor without the need for external authorization ⁷⁴ .	Modify the paragraph numbers as shown in proposed new text accordingly.	Replaced			To reallocate
18.	3.107	<i>Interfaces with emergency preparedness</i> 3.107 <u>3.130</u> Arrangements for local response should be coordinated with the site, corporate and national level concerning functions, responsibilities, authorities, allocation of resources and priorities. The emergency response organization could include elements as depicted in Fig. 2.	Modify the paragraph numbers as shown in proposed new text accordingly.	Replaced			To reallocate
19.	<u>3.132a</u>	Add the following sentence after para. 3.132 or 2.27 as <u>“Interface with waste management on remediation of contaminated area during accidents should be considered in an appropriate manner.”</u> .	There has been stated in the DPP as for the interface with waste management.	Added			To add waste management for immediate cleanup and remediation of large volume of radioactive waste or discharges that

COMMENTS BY REVIEWER:				RESOLUTION			
Reviewer: Japan NUSCC member		Page 1 of					
Country/Organization: Japan/NRA		Date: 22 MAY 2015					
No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify/reject.
							can be generated during the emergency situation activities
20.	REFEREN CES [10]	GS-R-2 should be replaced GSR Part 7.	Update the information.	corrected			To update information
21.	ANNEX	Japan NUSCC would like to propose our practice in ANNEX at the NUSCC meeting.	Just information.				

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Korea

COMMENTS BY REVIEWER				RESOLUTION			
Country/Organization: Republic of Korea/Korea Institute of Nuclear Safety (KINS) Date: 20 May 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	Page 29 §3.69 §3.70 Page 32 §3.86 §3.87	<i>General Comments on Multi-unit sites</i> Add general requirement and main principle for accident management for multi-unit site including “loss of large area”	Para 3.69, 3.70, 3.86, 3,87 and 3.88 addressed the provisions on procedures and hardware for accident management of multi-unit sites, However, general requirements and main principles for accident management of multi-unit sites including loss of large area due to extreme external events including man-made event are not properly addressed.	Add Footnote 5 External hazards include all extreme weather conditions	2.5a The accident management programme should address all modes of operation and external hazards relevant ⁵ for the site considered, taking into account some possible dependencies between events . It should also consider that external hazards could result in significant damage to		To clarify the statement

COMMENTS BY REVIEWER				RESOLUTION			
Country/Organization: Republic of Korea/Korea Institute of Nuclear Safety (KINS) Date: 20 May 2015							
Comment No.	Para/Line No.	Identified problem/Proposed new text	Reason/Description	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
					the infrastructure on-site or off-site.		
2	Page 1 §1.2	...Accident conditions more severe than a design basis accident and involving significant fuel degradation <u>significant core degradation</u> are termed severe accidents [5].	While the referred reference [5] addressed “DEC, including accidents with significant degradation of the reactor core, para. 1.2 mentioned DEC involving significant fuel degradation ae termed severe accident, It is generally understood that the terms of “damage” comes from the consequence of degradation. Therefore, the terms of significant core degradation or damage would be more comprehensive term.	Replaced			To consistence with relevant safety requirements SSR-2/1, SSR-2/2 and GSR Part 4
3	Page 4 7th row of Table 1	<i>It would provide better understanding to change the terms of “verification of effectiveness” with “validation’ or “validation of effectiveness”.</i> - 1 st column Verification <u>Validation</u> of effectiveness - 2 nd column The effectiveness of the accident management measures can be verified <u>validated</u> with reasonable accuracy - 3 rd column	It is generally understood that the meaning of verification is to evaluate whether or not a product, service, or system complies with a requirement or imposed condition, while validation is to evaluate the usefulness of effectiveness. Also, it is hard to assess the accuracy of effectiveness due to its implication.			Rejected	The IAEA Safety Guide NS-G-2.15 Error! Reference source not found. “Severe Accident Management Programme for Nuclear Power Plants” defines verification as <i>a process to confirm the correctness of a</i>

COMMENTS BY REVIEWER				RESOLUTION			
Country/Organization: Republic of Korea/Korea Institute of Nuclear Safety (KINS) Date: 20 May 2015							
Comment No.	Para/Line No.	Identified problem/Proposed new text	Reason/Description	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		The effectiveness of the accident management measures can be verified validated in a limited way					<i>written procedure or guideline and to ensure that technical and human factors have been properly incorporated.</i>
4	Page 6 §2.4	Paragraph 4.7 in reference [10] dealing with minimization of consequences of any nuclear or radiological emergency on people's health, property and the environment requires that the transition from normal to emergency operation shall clearly defined and be effectively made without jeopardizing safety to prevent jeopardizing plant safety.	Emergency operation implies the jeopardized plant safety limit. The expression of "without jeopardizing safety" is so vague in terms of which level of safety.	Replaced			To clarify the statement
5	Page 7 §2.9	Multiple strategies should be developed to achieve the accident management objectives, including: ... · Maintaining the integrity of reactor vessel to limit in-core melt progression.	The strategies for maintaining the integrity of reactor vessel for limiting in-core melt progression is a vital factor for managing severe accident.	Added	Maintaining the integrity of reactor vessel to prevent melt thru progression		To clarify the statement

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South Africa

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: NUSSC		Page..1.. of..6..					
Country/Organization: South Africa		Date:					
Com ment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejectio n
1	1.7	An effective accident management programme requires that plants establish the necessary infrastructure to prevent, mitigate or respond effectively to severe accident conditions,	To be consistent with Item 1.6, which states: “... accident management programme. This programme ... to take effective on-site actions to prevent or mitigate the consequences of a severe accident.”	Added			To clarify the statement
2	Last row of Table 1 on p.4	possible use of design extension margins upon advice, or decision, by the Technical Support Centre	The word “of” is missing.	Added			To correct typo error
3	Footnote 4 on p.7	Containment /Confinement integrity in PWRs	Space inserted between Confinement and integrity	Corrected			To correct typo error
4	Footnote 4 on p.7	the emergency feedwater system, the plant the plant fire-fighting system, or any other means that could	Repetition of “the plant” removed and “mean” replaced by “means”.	Corrected			To correct typo error
5	2.9	Multiple strategies should be developed to achieve the accident management objectives, which includes	Replaced “including” with “which includes” in order to enforce the meaning that the bulleted list applies to “accident management objectives” and not to “Multiple	Added			To clarify the statement

			strategies”. Without this replacement of words, the reader is left uncertain as to which of the two phrases the list applies. According to Item 3.29 on p.21 it must apply to objectives and not to strategies.				
6	2.12	... procedures and guidelines, should be developed from the strategies and measures for the personnel responsible for	To make it consistent with Item 3.1 (5) on p.15, which associates strategies and measures with procedures and guidelines.	Added			To clarify the statement
7	2.13	... to prevent large or early radioactive releases ⁷ .	Full stop added at the end of Item 2.13.	Corrected			To correct typo error
8	Footnote 6 on p.8	... to a plant is and is stored in an on-site ...	Replaced superfluous “is” with “and”.	Corrected			To correct typo error
9	Footnote 16 on p.11	Reasonable assurance can be obtained through evaluating whether, based on available information coming from different sources, there exist ...	Fixed 2 typing errors and added a comma.	Corrected			To correct typo error
10	3.12	... responsible for EPR planning ...	A list of abbreviations with their meanings should be added to the document. The abbreviation EPR is one of many examples of abbreviations appearing in the document.	abbreviation s of EPR is only used for Emergency Preparedness and Response			For editorial improvement
11	Footnote 31 on p.18	Also # called “cliff-edge effect”.	Deleted the word “it”.	Corrected			To correct typo error
12	3.26, 2 nd last bullet	wearing protective clothing and portable breathing gear, and	To make it consistent with Footnote 34 on p.20.	Added			To clarify the statement

13	3.35	Support items such as fuel for portable equipment should be available.	Words added to enhance clarity.	Added			To clarify the statement
14	Footnote 42 on p.23	It should be known how long water sources will be available ...	Word added to enhance clarity.	Added			To clarify the statement
15	3.59	... start automatically or change configuration ...	Corrected typing error.	Correct			To correct typo error
16	3.59	... all automatic actions should be reviewed for their impact in the mitigatory domain and, where appropriate, equipment should be inhibited, in the mitigatory domain, from automatic start.	These suggested added words may not be the best text to clarify the meaning here. This reviewer recommends that great care be taken to leave no room for misinterpretation whenever inhibition from automatic start is propagated. Therefore, please add explanatory text here to leave no room for misinterpretation.	Added			To clarify the statement
17	3.67 last bullet	... while parameters that called upon the first one are changing value in a safer direction?	Words added to enhance clarity if that was the intended meaning.	Added			To clarify the statement
18	3.68	- Results of supporting analysis; - The basis of measures - The basis and detailed description of steps in procedures and guidelines; ...	Text added to cover another case from Figure 1 on p.7.	Added			To clarify the statement
19	Footnote 53 on p.28	Adequate lighting,	Corrected spelling error.	Corrected			To correct typo error
20	Footnote 58 on p.29	... of highly contaminated residual heat removal pump ...	Corrected typing error.	Corrected			To correct typo error
21	3.88	... In the event of a design extension conditions involving a reactor ...	Corrected typing error.	Corrected			To correct typo error

22	3.102	... in case of failure of the primary communications systems and period .	Deleted text which is not clear. Was some other more meaningful text intended here?	Corrected			To correct typo error
23	Footnote 72 on p.35	... for using portable equipment ...	Corrected typing error.	Corrected			To correct typo error
24	3.126	... The technical support centre should communicate extensively with the control room staff during accidents to benefit from their expertise of and insight into the plant capabilities.	Words added in case that was the intended meaning. If not, appropriate text should be added here to avoid leaving the meaning open to interpretation.	Added			To clarify the statement
25	3.130	... Where manual transfer of data from the plant is needed, this should preferably be done by a dedicated member of the technical support centre.	Words added in case that was the intended meaning. Otherwise the reader's understanding of the direction of data transfer may remain uncertain.	Added			To clarify the statement
26	3.133	... should be established on coordination of emergency response activities ...	Corrected typing error.	Corrected			To correct typo error
27	3.137	... cross-functional safety review of the plant and should be performed with the objective of ...	Word added.	Corrected			To correct typo error
28	Footnote 97 on p.45	... has based its procedures and guidelines on a reference design ...	Corrected typing error.	Corrected			To correct typo error
29	Footnote 97 on p.45	... existing sequences with different weight ...	Corrected typing error.	Corrected			To correct typo error
30	3.160	... to aid in decision making regarding upgrades to plant SSCs and instrumentation.	Words added to enhance clarity. Otherwise the reader could also interpret it as meaning upgrades to accident management programmes. Whatever	Added			To clarify the statement

			the intended meaning here, words should be added to make the meaning unambiguous.				
31	3.165 (1)	... The full list of plant damage states should be screened out to remove less important plant damage states ...	To improve the grammar.		Reword: screened for the less important		To clarify the statement
32	3.165 (2)	... and the amenability of the chosen sequence to preventive accident management measures.	A footnote should explain why the amenability to mitigate accident management measures is excluded here if that is the intended meaning.	It is included in the selection of accident sequences that the amenability of the chosen sequence to preventive accident management measures			N/A
33	3.176	The operating organization should integrate all the elements of the accident management programme with the existing management system so that processes and activities that may affect safety are established and conducted coherently for the protection of site personnel	Text improvements at three locations in the text.	Replaced			To improve wording
34	4.2	... The control room staff should continue to work with actions already initiated in the EOP domain providing they are consistent with the rules of usage of	Text added to enhance clarity.	Added			To clarify the statement

		the SAMG guidance.					
35	General comment	n.a.	As a general comment, there is room for reducing the length of the document by consolidating many instances of repetitive use of text and concepts. It is realized that such repetition inevitably builds up during a document's development and that it may be too challenging to consolidate the text at this late stage.	Consolidate and deleted redundancy Paras.			
36	Foot note 2; Page 1	...”The aim of the fourth level of defence in depth is to ensure that	Editorial	corrected			To improve wording
37	Section 2.29; Page 11	“.....(preferably demonstrated by equipment qualification or at least by assessment of the survivability as well as international best practice or experience).....”	Suggested inclusion to text	reworded			To clarify the statement
38	Section 3.9; Page 17; 1st para; 6th bullet	An administrative control....	Editorial	deleted			

Draft Safety Guide DS483 “Accident Management Programmes for Nuclear Power Plants” (Version dated 9 April 2015)
Status: STEP 7 – First review of the draft safety standard by the SSCs

Ukraine

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page					
Country/Organization: Ukraine/ State Scientific and Technical Centre for Nuclear and Radiation Safety (SSTC NRS)		Date: 22 May 2015					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	Para 3.79, Page 31	To add new bullet to para 3.79: “When containment venting is contemplated or directed, the accident management strategies should provide guidance for the following: ...Provisions to avoid hydrogen detonation in the venting discharge pipelines and filters”	Hydrogen may detonate in the venting discharge pipelines and filters due to environment de-inertization and steam condensation. Specific provisions should be provided, e.g. nitrogen injection etc.	Added			To improve the Para.
2	Para 3.152	To modify the para 3.152 as follows: «Results from exercises and drills should be systematically evaluated to feed back into the training programme and, if applicable, into the procedures and guidelines as well as into organizational aspects of accident management».	A systematic evaluation of the exercises and drills provides more valuable basis for improvement of procedures and guidelines.	Added			To clarify the statement

3	Para 3.164, Page 47	To remove the text in the brackets: «PSA Level 1 and 2 (if available) in combination with engineering judgment should be used for selection of the scenarios».	Using PSA Level 1 and 2 is a common practice and may be mentioned without exemption.	Deleted			To consistency with SSG 3 and SSG 4
4	Para 2.10, page 8	To modify the last sentence of para 2.10 as follows: "During the accident such measures would include use of systems and equipment still available to cope with the accident (also beyond design limits) , recovery of failed equipment and use of portable and mobile equipment stored on-site or off-site"	If dedicated safety systems have failed, other design systems can alternatively be used to cope with the accident. For example, in the case of LOCA with HPIS failure, the makeup system can be used at least on a temporary basis to compensate for coolant loss.	Added			To clarify the statement

Draft Safety Guide DS483 “Accident Management Programmes for Nuclear Power Plants” (Version dated 9 April 2015)
Status: STEP 7 – First review of the draft safety standard by the SSCs

United States of America

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSSC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	1.7/ Line 8	affect multiple units on the same site and last for extended periods	For completeness	Added			To clarify the statement
2	1.8	Original: “1.8 This Safety Guide presents recommendations for the development and implementation of an accident management programme” Recommend clarifying how this safety guide relates to Reference 13, Implementation of Accident Management Programme in Nuclear Power Plants.		Reference 13, Safety Report is a technical supporting document to this draft safety guide.			N/A
3	1.12 / page 3 / last sentence	... descriptions of specific severe accident management guideline (SAMG) implementation approaches in different countries....	First time acronym used, clarification needed	Added			To correct wording
4	Table 1 / page 4	The abbreviation EOP should be written out on page 4.	Completeness to facilitate reader’s comprehension.	Added			To correct wording
5	General & Para 2.4	DS483 should discuss and reference GSR Part 3 (the BSS) in order to identify transitioning from emergency exposure situation into existing, or planned, exposure situation, and when	Accident management program should address when emergency exposure situation ends and when existing, or planned,	Added 2.4a and reference			To add new para for the transition from an emergency exposure situation to an existing exposure

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSSC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		emergency is terminated. This is necessary since IAEA adopted ICRP approach and safety criteria associated with each exposure situation could be different. We suggest that DS483 refer to DS468, which is under development.	exposure situation would be initiated. This is necessary since safety criteria under these exposure situations could be different.				situation
6	2.4 and Footnote # 108 on page 56 (and 3.12)	EPR abbreviation was used on page 6, Para 4 to denote “emergency preparedness and response.” However, the same abbreviation was used to denote “European Pressurized Reactor.” We recommend that DS483 be consistent in use of abbreviations and terminology.	Consistency in use of abbreviations and terminology.	Corrected to be used only for “emergency preparedness and response”			To correct wording
7	2.8 / page 7 footnote 4 3rd sentence	Footnote: the emergency feedwater system, the plant the plant fire-fighting system...	Remove redundant “...the plant...”	Deleted			To correct typo error
8	2.10 / page 8 Footnote 6	Footnote: ...connected to a plant is is stored in ...	Remove repeated word	Deleted			To correct typo error
9	2.14	“Accident management guidance should be developed for credible challenges irrespective of their probability of occurrence of the challenges.”	Recommend using “credible challenges” instead of “challenges”	Added			To clarify the statement
10	2.15	Footnote 8, ADD: floods	For completeness	Added			To improve wording
11	2.24	“Accident management should consider the loss or unreliability of indication of key plant parameters.”	Failing systems may still provide indication but the values may be invalid.	Reworded			To clarify the statement
12	2.29	Reword: “When adding or upgrading	Recommend changing the	Reworded			To clarify the

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSSC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		equipment or instrumentation is contemplated, related design requirements should be such that there is reasonable assurance this equipment or instrumentation will operate as intended under the environmental conditions present when it is used (preferably demonstrated by equipment qualification or at least by assessment of the survivability)17”	text to eliminate use of the term “reasonable assurance”, because it has a specific and different meaning in the U.S.				statement
13	2.32	Additional guidance is needed regarding validation of actions and estimation of time margin for extreme environmental events.	Demonstration of feasibility of actions may not be enough if environmental conditions during the demonstration are not similar to those expected in extreme situations. (Setting up a portable pump is much easier on a sunny day than in a flood).	Reworded			To clarify the para.
14	2.33	“Further details on EOPs may be found in Refs [11, 12].” Reference should be to references 11 and 12 rather than 10 and 11.	References 11 and 12 are both procedure related, reference 10 is related to emergency preparedness	Corrected			To correct typo errors
15	2.38	Additional guidance is needed.	Consideration of differences between the drill/exercise conditions and the expected environmental conditions is necessary				n/a

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSSC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
16	2.40 / page 13 Footnote 20	Footnote:described in Nuclear Energy Institute's (NEI) 12-06....	Users may not be familiar with NEI acronym	Added			To improve wording
17	2.41	Additional guidance is needed to describe when background documentation is "considered necessary."	It may be difficult to decide when basis documents are necessary. If an event occurs and basis documents are no available this can cause confusion. The rationale for guidance is always useful, but the lack of it may cause problems.	Added in para 2.41			To clarify the necessary of background document.
18	2.47	... "the training should be commensurate with their responsibilities in the preventative and mitigatory domains as well as support the transition between domains."	2.45 points out that the transition is important. It is logical that the transition should be trained for.	added			To clarify the para.
19	3.7	Line 2, delete "probabilistic safety assessment" and parentheses since PSA was spelled out on page 15.	Editorial and redundancy.	Added			To improve wording
20	3.12	Original: "persons responsible for EPR planning..." Recommend clarifying the abbreviation "EPR"	The term "EPR" is ambiguous, because it also is defined below as European Pressurized Reactor.	EPR is only used for "emergency preparedness and response"			To improve wording
21	3.17	Typo in footnote 31: Also it is called	grammar	Corrected			To correct typo error
22	3.25	ADD: "Additional time margin should be added to ensure conservative task	Often credible and likely performance shaping factors	Added			To improve the para

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSSC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		time estimates.”	are ignored or minimized in these considerations.				
23	3.43 / page 24 Footnote 44	Footnote: ... before the technical support center (TSC) ...	Users may not be familiar with TSC acronym	Added			To improve wording
24	3.65	operability and accessibility of the control room or and the Technical Support Centre.	For completeness	Deleted “or”			To improve wording
25	3.101	Comments: An additional paragraph is needed under the Personnel Staffing and Needs section to address personal protective equipment, KI and individual dosimetry. The draft guide addresses the need for non-perishable goods (food and amenities), but there is no mention of how and what the Emergency Response team is equipped. Training with self-contained breathing apparatuses and proper fitting of face masks must be done before the accident, not during the emergency. Who is monitoring worker exposure during the accident?	<u>Completeness</u>	<u>Deleted 3.101 because it is out of scope of accident management</u> Licensees should be responsible to maintain all personal protective equipment, including equipment for use in an emergency in proper condition, and, if appropriate, is tested at regular intervals.			n/a
26	3.102	Add: The effects SBO on the communications equipment should be considered	For completeness	Added			To clarify the sentence
27	3.107	“Arrangements for local response should be coordinated with the site,	Recommend adding “state” and “regional” to be	Added			To clarify the areas for local response.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSSC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		corporate, regional, state, and national level...”	included in making arrangements for local response.				
28	3.107	Comment: An additional paragraph highlighting the interface between the utility emergency response organization with the off-site public emergency response organization is needed. Recommended public actions (shelter in place, evacuation, KI intake, etc.) are coordinated and communicated by and with whom?	Completeness	Added	3.107a An effective response to an emergency requires strong linkages between accident management and emergency plan (EP). An EP involves how nuclear facilities and other concerned organizations prepare for and plan to respond to emergencies (including nuclear or radiological emergencies, both onsite and offsite), in order to protect workers, the public and the environment		To improve text

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSCC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
29	3.114 / page 37 last sentence	... off-site teams. And a Accident management should...	Delete "And..." at the start of the sentence.	Deleted			To correct typo error
30	3.115 / page 37	...responsibilities, period when placing...	Delete the word "period;" it appears out of context	Deleted			To correct the typo error
31	3.122	Original: "In particular, a highly reliable communication network should be provided, and necessary guidance on communication devices and consumables to be taken in case of failure of communication should be established." Recommend clarifying what is meant by the term "consumables."		Deleted Consumables means back-up inventory but it seems to be make sense			To clarify the wording
32	3.124 / page 39 Footnote 79		Unclear as to need or meaning of footnote #79?	Deleted			To clarify the footnote
33	3.131	Extended loss of AC power should be considered in providing for communication between the control room, and the technical support centre and offsite.	For completeness	Added			To clarify the para.
34	3.138	Add a footnote explaining how environmental conditions are not likely to be realistic during validation and how to account for this.	Environmental conditions will vary greatly between the validation and actual use. Additional time margin should be considered beyond	Added the footnote "Environmental conditions including temperature,			To clarify the para.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSSC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			what is observed in the validation. Actual environmental conditions should be documented as per line 3.140.		pressure, humidity, radiation, chemicals will vary greatly with the time and location so that the equipment important to safety must be established for the most severe design basis accident.		
35	3.158 / page 46 Footnote 98		Users may not be familiar with acronyms RAMP, OSART, and WANO – specify them	Added			To clarify the wording
36	Annex I / page 55		Users may not be familiar with acronyms EDF, GIAG –specify them	Added			To clarify the wording
37	Annex I / page 56		User may not be familiar with acronyms SRVs, DCH, RPV, RCS, SGTRs, – specify them	Added			To clarify the wording
38	Annex II / page 57, 2nd paragraph	In addition, to keep abreast with the international community, the development of SAMGs has been started in 2010, and full	Is this 2014 hardware modification now complete? This sentence needs to be updated.	Corrected			To clarify the wording

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSSC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		completion is contemplated for the end of 2014.					
39	Annex III / page 60, 2nd paragraphvendors have adopted the use of flowcharts.	Incomplete thought.	Deleted			To delete incomplete information
40	Annex III/ page 60, 3rd paragraph		Users may not be familiar with acronyms EPRI, TBR –specify them	Added			To clarify the wording
41	ANNEX III 3rd Paragraph	Original: “The other two PWR vendors rely on logic diagrams to establish the EPRI TBR plant damage states.” Recommend defining the abbreviation “TBR.”		Added			To clarify the wording
42	Annex III / page 61 2nd paragraph 3rd bullet	Injection of water in the Steam Generators (number priority for WOG) or the core (other PWRs or BWROG);	Number one priority is the intent?	Added			To correct typo error
43	General comment		References number [9], [17], [18] and [19] are not noted in the text – suggest removing them unless deemed important to users	Deleted [17] and [18]	Added reference [19] In 3.175		To clarify the references
44	General	The guidance lacks management aspects regarding control, containment, and management of large volume of radioactive waste or discharges that can be generated during the emergency	Completeness to address control, containment, and emergency management of large volumes of discharges and waste generated after	3.132a Interface with waste management on remediation of large volumes of			To add relevant interfacing areas

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSSC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		situation and during transitioning into existing exposure situation after immediate cleanup and remediation activities.	severe accident.		contaminated discharges and waste generated during accidents should be considered in an appropriate manner. 3.78a When containment venting is possible, the accident management programme should provide guidance on its use to prevent uncontrolled loss of containment integrity and to mitigate releases of radionuclides causing long-term off-site contamination. Therefore the 3.64 containment venting should always be filtered. Guidance should		

COMMENTS BY REVIEWER				RESOLUTION			
Reviewers: U.S. Nuclear Regulatory Commission Country/Organization: United States of America / NUSSC Date: 22 May 2015							
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
					be provided for performing venting under conditions such as loss of power and high radiation levels and high temperatures in areas where vent valves are located (if local access is required).		

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EC-JRC

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: EC-JRC 3 Country/Organization: EC 20.5.2015		Page 1 of Date:					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	Footnote 2	defence-in-depth (3 rd line)	misspelling	Corrected			To correct typo error
2	Footnote 40	"... from very severe ..."	misspelling	Corrected			To correct typo error
3	3.41	"... consistent language and specific terms ..."	"the use of" is misplaced	Corrected			To correct typo error
4	3.47	In the mitigatory domain the control room operators and technical support staff should be able to identify the challenges to fission product barriers and plant damage conditions, based on the monitoring of plant parameters (symptom-based approach). Measures should be taken to avoid potential misdiagnosis of the plant conditions that could impact the proper execution of the guidelines.	The first half-sentence is superfluous because it describes what should not be necessary. The second sentence of 3.47 is not to the point, because guidelines are executed in the mitigatory domain.	Reworded as proposed			To clarify the statement
5	Footnote	"... temperature rise and degree of	wording	Added new			To clarify the

	46	fuel degradation ..."		words			statement
6	3.59	configuration	misspelling	Corrected			To correct typo error
7	3.61	Reviewer comment: the 5 th and 6 th points in the list ("the likelihood of successful recovery ..." and "dependence on a number of ...") should be reviewed	current text is cryptic, should be more specific to be understandable	Reworded	Possibility to recovery from failures if several pieces of equipment are out of service: The consequences of a failure for critical pieces of equipment; and		To clarify the statement
8	Footnote 58	"heat"	misspelling	Corrected			To correct typo error
9	3.79	3.79 should be placed in the section "Development of accident management strategies"	3.79 is not about hardware upgrade and thus placed in the wrong section	Reallocate as 3.38a			To clarify the statement
10	3.86	3.86 should be placed in the section "Development of accident management strategies"	3.86 is not about hardware upgrade and thus placed in the wrong section	Reallocate as 3.39a			To clarify the statement
11	3.88	"... considerations are met for each reactor."	wording	corrected			To correct typo error

12	3.92	"In many cases, instrument indication ..."	wording	corrected			To correct typo error
13	3.102	"... measures to be taken if off-site communication fails and only the part of the emergency response organization located at the plant site remains functional."	the last part of the sentence is doubling the phrase "if off-site communication fails"	delete			Top avoid redundancy sentence
14	3.110	"... to ensure that conflicts are resolved"	wording	Corrected			To correct typo error
15	3.115	Reviewer comment: paragraph should be reviewed	I have no idea what "period" means in the phrase "period when placing ..."	Delete 'period'			To clarify the statement
16	Fig. 2	Reviewer comment: Fig.2 should be displayed close to 3.107	the figure should be displayed in a place close to where it is mentioned	Relocated			To clarify the statement
17	3.123	"... until the new decision maker is ready to assume his/her role."	wording	Replace words			To correct typo error
18	3.133	"... established ..."	misspelling	Corrected the word			To correct typo error
19	3.137	"... safety review of the plant and should be performed ..."	wording	Add "and"			To correct typo error
20	3.144	"... from external hazards, under potentially high radiation situations and under influence of stress on the anticipated human behavior."	wording	Reworded as proposed			To clarify the statement

21	3.165	"... screened for ..."	wording	Corrected			To correct typo error
22	3.176	"... existing ..."	misspelling	Corrected			To correct typo error

Draft Safety Guide DS483 “Accident Management Programmes for Nuclear Power Plants” (Version dated 9 April 2015)

Status: STEP 7 – First review of the draft safety standard by the SSCs

ENISS

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: ENISS		Page: 1 of 21					
Country/Organization: ENISS		Date: 20 May					
2015							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
General comment on terminology		The report uses different terms such as extreme external events and external hazards to mean the same thing. The usage should be unified, e.g. by using term "external hazards" to mean consistently all extreme weather conditions, earthquakes, external fires and floods, man-made hazards (such as explosive and toxic gas clouds, oil-spills..) etc.		Using term “external hazards”			To consistency with relevant safety requirements SSR 2/1 and SSR 2/2
1	Title	<u>Severe</u> Accident Management Programme for Nuclear Power Plants.	To be consistent with the DPP that is published on the IAEA website (version 3 – 10 April 2014). This is also more consistent with the content.			Accident Management Programme for Nuclear Power Plants.	To consistency with relevant safety requirements SSR 2/1 and SSR 2/2 and the scope is extended to cover the prevention domain and mitigate domain
2	1.5	Depending on plant status, accident management actions are prioritized as follows: <ul style="list-style-type: none"> Before the onset of fuel damage, priority is given to preventing the escalation of the event into a severe accident (preventive domain of accident 	Typo modification (two different paragraphs) to clearly indicate the two different stages: before and after the fuel damage.	corrected			To correct typo error

		<p>management). In this domain, actions are implemented for stopping accident progression before the onset of fuel damage, or, delaying the time at which significant fuel degradation happens.</p> <ul style="list-style-type: none"> • When plant conditions indicate that fuel damage has occurred or is imminent (mitigatory domain of accident management), priority is given to mitigating the consequences of severe accidents through: <ul style="list-style-type: none"> - preventing the uncontrolled loss of containment integrity, - performing any other actions having the potential for limiting fission product releases to the environment and avoiding releases of radionuclides causing long-term off-site contamination, 				
3	2.5	<p>An accident management programme should be developed and implemented for all plants irrespective of the core damage frequency and fission product release frequency calculated for the plant, including new plants equipped with dedicated systems for mitigation of severe accidents.</p> <p><u>The level of of guidance and associated demonstration should be commensurate to the safety objectives: no demonstration of efficiency is needed for accident</u></p>	<p>The Fukushima accident was not induced by an event of a very low frequency. This does not preclude the interest to consider in the AMP events of very low frequency. However priority should be given to the most probable events and requirements associated to the situations should be graduated depending on</p>		<p>Add footnote for the core damage frequency with “The possibility of certain conditions occurring is considered to have been practically eliminated if it is physically impossible for</p>	<p>To consistence with relevant safety requirements SSR 2/1, SSR2/2 and NSG1.4</p>

		<p><u>management of situations that have been practically eliminated in the design [5].</u></p>	<p>their frequency. With the current wording of the guide, it can be understood that situations that have been practically eliminated during the design, or that have a very low frequency with a high degree of confidence should require the same justifications than more frequent sequences. However, this does not reflect the practice from member states and does not correspond to the intent from the IAEA requirements documents. This will generate undue time consuming studies, and therefore will not improve safety.</p> <p>As an example, situations of fuel degradation in the spent fuel pool could not have the same level of demonstration as situations of SA in the reactor building (for example in terms of plant accessibility, dose rate, mitigation of hydrogen challenge...). They shall be practically eliminated according to SSR 2/1 and as a consequence,</p>		<p>the conditions to occur or if the conditions can be considered with a high level of confidence to be extremely unlikely to arise”.</p>		
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			SSR2/1, SSR2/2 and NSG1.4 do not require anything for severe accident mitigation in the spent fuel pool. However AMP could provide some indications about actions to deal with such situation (for the fuel building, strategies are mainly related to water injection to restore pool water level), but no demonstration of efficiency should be recommended.				
4	2.9	Multiple strategies should be developed to achieve the accident management objectives, including: -Preventing severe fuel damage; -Terminating the progress of fuel damage once it has started <u>as far as it does not preclude the following objectives:</u> -Maintaining the integrity of the containment and preventing containment by-pass; -Minimizing releases of radioactive material, including releases from any source of radioactive material outside containment; and -Achieving a long term safe stable state.	The objective of terminating the progress of fuel damage is an intermediate objective. As it is written in §1.5, main objectives in severe accident are to maintain the containment integrity and to limit any fission product releases. So the intermediate objective is valid only if it does not prevent the subsequent ones to be achieved.	Added			To clarify the statement
5	Footnote 7	For example, at Fukushima Daiichi units 2 and 3 and 4, partial depressurization of the containment	At unit 4 the core had been removed to fuel pool.	corrected			To correct typo error

		allowed operation of the RCIC (Reactor Core Isolation Cooling) system over a longer period than would have been anticipated under fully depressurized conditions.					
6	2.14	<p>2.14 Accident management guidance, including guidance for management of severe accidents, should be developed for all physically identifiable challenge mechanisms to minimize the impact on public health and safety, for which the development of such guidance is practicable. Accident management guidance should be developed <u>even for challenges of low probability of occurrence. The level of guidance and associated demonstration should be commensurate to the safety objectives: no demonstration of efficiency is needed for accident management of situations that have been practically eliminated in the design [5].</u></p>	<p>Idem comment to 2.5. Also one could find in the challenges the meteorite fall, that has a very low probability (10^{-10} or less) of occurrence and for which it is not reasonable to develop a guideline. It should be possible to define a cut off frequency to exclude events that are not credible</p>		<p>Accident management guidance should be developed for high credible challenges¹ irrespective of the probability of occurrence of the challenges</p> <p>Footnote The possibility of certain conditions occurring is considered to have been practically eliminated if it is physically impossible for the conditions to occur or if the conditions can be considered with a high level of confidence to be extremely unlikely to</p>		To clarify

					arise”.		
7	2.26	<p>The potential damage of fuel both in the reactor vessel and in the spent fuel pool, and dry storage if appropriate, should also be considered in the accident management guidance.</p> <p><u>Management of fuel damage in the spent fuel pool could deal with adding water in the pool in order to restore water level.</u></p>	<p>This paragraph could be adapted as any GEN2 or GEN3 spent fuel pool is design to deal with specific challenges caused by SA. Proposal to add a sentence at the end of the paragraph. Same proposal for paragraph 3.6.</p>	Added			To clarify the para.
8	2.24	<p>Accident management should consider the loss of indication of key plant parameters <u>that have not been designed against extreme events.</u></p>	<p>Possible combinations of loss of indications may lead to a very complex set of guidelines, with, in some cases, real difficulties to manage the situation when the essential plant parameters are lost. This goes far beyond SSR 2.2 requirements. It appears more effective to make essential plant parameters robust against extreme events and such possibility could be taken into account in this guide (see proposal).</p>	Added			To clarify the para
9	2.27	<p>The accident management programme should cover <u>address all modes of operation and</u> all-external events relevant for the site considered, taking into account <u>some possible</u> dependencies between events ¹⁴, and all modes of</p>	<p>“Cover” is too large. “All modes of operation” should be moved before external events (as in previous version). “All” is not appropriate with “relevant for the site</p>	Replaced			To clarify the para

		operation. It should also consider that external events could result in significant damage to the infrastructure on-site or off-site.	considered". Restriction for the dependencies between external events.				
10	2.29	When adding or upgrading equipment or instrumentation is contemplated, related design requirements should be such that there is reasonable assurance ¹⁶ (preferably demonstrated by equipment qualification or at least by assessment of the survivability) that this equipment or instrumentation will operate as intended under the <u>anticipated</u> environmental conditions present when it is is <u>should be</u> used ¹⁷ . The equipment should be designed against accident conditions/loads for severe accidents and extreme external hazards , commensurate with the function that is to be fulfilled, provide adequate margin to failure when it is expected to operate; <u>The equipment should be installed in areas that are not likely to collapse and create un-repairable damage to the component, and independent, as far as practicable, from other existing systems during the accident conditions¹⁸. <u>The external events should be considered when adding or upgrading an equipment or instrumentation.</u></u>	Impossibility to know the conditions: addition of anticipated and use of conditional. External hazards/events should be considered as indicated in 2.27: removal of extreme external hazards, removal of consideration on location of equipment (too much detailed) and removal of footnote 18. Addition of a global sentence for the consideration of external events. At the end, the disposition should not hinder the installation of equipment dedicated to severe accidents (due to too many prescriptions). Note that the notion of extreme external events is not included in SSR 2/1 nor in SSR 2/2 and therefore should not be introduced through a safety guide	Added			To clarify the para
11	Footnote	Accident conditions include severe	Removal of footnote 18:	Deleted			To delete

	18	accidents and effects of extreme external hazards	external hazards/events should be considered as indicated in 2.27 (where external events are defined).				redundancy
12	2.32	New equipment, either fixed, or portable ¹⁹ that is stored onsite or offsite, should be protected from external events that cause the challenge. For portable equipment, the ability to move the equipment from its storage location to the location where it fulfils its accident management function and to perform the necessary connections in the time frame needed should be demonstrated <u>verified</u> . Impact of the new or modified equipment on the staffing needs as well as expectations for maintenance and testing should be addressed.	“Demonstrated” is too strong and not applicable practically.	Replaced			To improve wording
13	Footnote 19	Portable equipment is contemplated in particular to address situations where extreme external events accidents have occurred and incapacitated essential equipment needed to fulfill essential safety functions. Examples of justification and use of portable equipment can be found in United States of America the USA, where developed <u>extended</u> <u>sive</u> damage mitigation guidelines (EDMGs) <u>were developed to reflect to B.5.b requirements</u> and Flexible Coping Strategies (FLEX) approaches <u>as a</u>	EDMG were not developed against extreme external events but for security purposes against malevolent actions.	Replaced			To correct type error

		<u>reaction to Fukushima.</u>					
14	2.34	In the mitigatory domain, large uncertainties may exist both in the plant status, availability of the protective systems and in the timing and outcome of actions. Consequently, the guidance for the mitigatory domain should not be prescriptive in nature but rather should include a range of potential mitigatory actions and should allow for additional evaluation and alternative actions. Such guidance is usually called severe accident management guidelines (SAMGs).	“Protective” is not appropriate for severe accident.	Corrected			To correct wrong wording
15	2.40	For extreme—external—events <u>situations</u> that result in normal accident management capabilities being unavailable such as loss of the command and control structure, support procedures may be developed to provide guidance on using instrumentation and equipment to cope with these conditions ²⁰ . In this case, command and control is re-established and clearly identified, and the severe accident management guidance includes conditions for use of these support procedures.	Avoid extreme external events, and the sentence remain true for other causes of loss of command and control structure. The first part of the sentence does not seem appropriate and should be removed. The term “guidance” is completed.	Replaced			To clarify the para,
16	2.42	If procedures, guidelines and supporting background documentation are stored in electronic form, hardcopy backups should be available in all evaluation and decision making locations, such as main control room,	The sentence should not be limited to station blackout.		When necessary		To improve wording

		supplementary control room and technical support centre ²² , so that they can be used in case of station blackout <u>if necessary</u> .				
17	2.46	A specialized team or group of teams (referred to in the following as the technical support centre) should be available to provide technical support by performing evaluations and recommending recovery actions to a decision making authority, both in the preventive and mitigatory domains. The technical support centre should have the capability, based on their knowledge of plant status to recommend mitigatory actions as deemed most appropriate for the situation. This should be done only after evaluating potential negative consequences, and the possibility and consequences of using erroneous information . If the technical support centre is composed of multiple teams, the role of each team should be specified.	The fact of using erroneous information should not be considered in “roles and responsibilities”. It may be added in the second bullet of 3.9.	Deleted and added in 3.9		To clarify the para
18	Footnote 26	External events <u>hazard</u> PSA, if available, can be useful in providing insights to the full spectrum of events to be considered.	External events in the PSA included initially such events as internal fires and internal floods. When referring to extreme weather conditions and similar, it is better to use term external hazard to avoid confusion.	Replaced		To consistence the word with relevant safety requirements, SSR 2.1 and 2/2.
19	Footnote	For example, Extended	This footnote is	Corrected		To correct typo

	28	Mitigation Guidelines (EDMGs) in the United States of America	misleading in para 3.5, since EDMGs were not developed against extreme external events. Compare with comment to Footnote 19				error
20	3.9	<p>The development of an accident management programme should consider the following:</p> <p>Available hardware provisions for execution of accident management strategies;</p> <p>The means of obtaining information on the plant status, and the role of instrumentation therein, including the cases in which <u>information provided by instrumentation is erroneous and</u> all normal instrumentation and control power is unavailable;</p> <p>Specification of lines of decision making, responsibility and authority in the teams that will be in charge of the execution of the accident management measures;</p> <p>Integration of the accident management programme within the emergency arrangements for the plant;</p> <p>Verification and validation of procedures and guidelines;</p> <p>Education and training, drills and exercises and evaluation of personal skills;</p> <p>...</p> <p>... A administrative control and</p>	<p>To be consistent with comment 8 (§2.46), addition of the possibility of erroneous information.</p> <p>Removal of “evaluation of personal skills”: this should be considered for NPP staff as a whole but not specifically in the frame of the development of the accident management programme.</p> <p>It is not clear, what is meant with this administrative system.</p>	Added and deleted			To clarify the para.

		management system for all tasks in the accident management programme					
21	3.12	The development team should contain staff responsible for the development and implementation of the accident management programme in the plant, including personnel from the training department, operations staff, maintenance staff, radiation protection staff, instrumentation and controls staff, engineering staff, persons responsible for EPR planning and external experts as appropriate ³⁰ . If use of a generic programme has been selected, experts familiar with this programme should <u>may support</u> be part of the development team...	Question on the partiality of this sentence from the vendor side.	Replaced			To improve the text
22	Footnote 33	An example of a generic technical basis that is widely used in Member States is provided in Electric Power Research Institute (EPRI) report on Severe Accident Management Guidance Technical Basis Report, Volumes 1 and 2, TR-101869-V1 and TR-101869-V2, EPRI, Palo Alto, CA (1992).	The statement made is not necessarily true. Could be replaced by "used in some Member States", but not needed as already introduced as an example.	Deleted			To correct the wording
23	3.23	All plant capabilities available to fulfill and support plant safety functions should be identified and characterized. This should include safety systems, as well as use of nondedicated systems, unconventional line-ups and	The connection points are not temporary, but they are used temporarily for hook-ups.	Replaced			To improve the wording

		<p>temporary hook-up connections for portable equipment located on-site or brought in from off-site. When unconventional line-ups or temporary hook-up connections are contemplated, consideration should be given to the availability of equipment necessary for easy use of these capabilities.</p>					
24	3.44	<p>The procedures and guidelines should contain as a minimum the following elements:</p> <ul style="list-style-type: none"> Objectives and strategies; Potential negative consequences of the actions; Initiation criteria; The time window within which the actions are to be applied (if relevant); The possible duration of actions <u>Long term monitoring of strategies;</u> The equipment and resources (e.g. AC and DC power, water) required; Consideration of <u>habitability for local actions</u> environmental condition in the location where actions would be carried out; Consideration of required personnel resources; Cautions and limitations; Local actions sheets (if relevant); Transition criteria and exit/termination condition; and Assessment and monitoring of plant response. 	<p>Replacement of “possible duration of actions” (what does this exactly mean?) by “Long term monitoring of strategies” for more accurate wording.</p> <p>Replacement of “environmental condition in the location where actions would be carried out” by “habitability for local actions” for more accurate wording.</p> <p>Removal of “Consideration of required personnel resources”: this should be dealt within the Emergency Plan and not discussed in SAMG themselves.</p>	Added			To clarify the para.
25	3.47	Although in the mitigatory domain it	It could be another		Replace as		To clarify the para.

		should not be necessary to identify the accident sequence or to follow a pre-analysed accident scenario in order to use the SAMGs correctly, the control room operators and technical support staff should be able to identify the challenges to fission product barriers and plant damage conditions, based on the monitoring of plant parameters.	member of the emergency organization (Safety engineer, shift supervisor...) that has this responsibility. Proposal to delete the word “operators”.		control room staff ¹ Footnote: Safety engineer, shift supervisor, etc.		
26	3.56	In addition to entry conditions to the SAMGs, exit conditions/criteria to long term provisions should be specified. Safe stable state should be clearly defined and provisions to maintain the long term safe stable state should be specified.	Wording: to be consistent with paragraph 2.9.	Added			To correct a missing word
27	Footnote 53	Adequate lightning <u>lighting</u> temperature, chemical conditions if appropriate...	Probably the lightning is not meant here.	Corrected			To correct the typo error
28	3.79	When containment venting is contemplated or directed <u>in the accident management strategies, it is recommended to consider the following in the guidance</u> the accident management strategies should provide guidance for the following: Situations when all AC and DC power is lost and the instrument air system is not available. Situations involving high radiation areas and high temperatures in areas where vent valves are located (if local access is required). An alternate means of venting the	The text is too prescriptive. At the end, it should not hinder the installation of equipment dedicated to severe accidents (due to too many prescriptions).	Replaced			To improve the text practically

		<p>containment if rupture disks are installed that could inhibit venting when required. The preferred option should be to vent using a pathway that is likely to provide some reduction of fission product release⁶³.</p> <p>The potential negative consequences⁶⁴ of containment venting should be assessed during the decision making process.</p>					
29	3.81	<p>For dedicated or upgraded equipment, its capability to perform the required actions in accident conditions including severe accidents and effects of extreme external hazards should be demonstrated.</p>	<p>It has already been said that external hazards should be considered in 2.29: it should not be repeated.</p>	Deleted			To delete the redundancy
30	3.85	<p>There should be inspection, maintenance and testing procedures available for all equipment to be used in accident management <u>accordingly with the safety significance of equipment</u>.</p>	<p>The text is too prescriptive. A graded should be applied.</p>	Added			To clarify the para
31	3.90	<p>Guidance should be provided to validate important instrumentation outputs (i.e., those used for symptom based diagnosis of potential challenges to fission product barriers or for confirmation of the effectiveness of implemented strategies). All important instrumentation readings should be verified with other independent information^{65 66} <u>where possible</u>. This should also be <u>highlighted in training practiced in drills and exercises</u>.</p>	<p>The text is too prescriptive. Independent information may not exist in some cases</p>	Replaced			To clarify the para

32	3.101 to 3.105	<i>Remove these 5 paras.</i>	These are not specific for accident management.	Delete 3.101, 3.104 and 3.105	Keep 3.102 and 3.103 because having reliable communication network and acceptable working condition (habitability) are relevant to accident management.		To clarify the para.
33	3.115	Impact of external events should be considered in the allocation of responsibilities, <i>period when placing the decision making authority for accident management at both on-site and off-site locations.</i>	The meaning of the second part of the sentence is not clear and should be adapted.		To transfer of responsibilities and decision making authority, impact of external hazards should be considered in the allocation of responsibilities, period when placing the decision making authority for accident management at both on-site and off-site locations.		To clarify the para.
34	3.118	The decision making authority in the mitigatory domain should lie with a high level manager, denoted as the emergency director. The emergency	The emergency director should not decide without assessment from the evaluators or only if really	Added			To clarify the para.

		director should be granted the authority to decide on the implementation of accident management measures proposed by the technical support centre or, <u>if needed</u> , based on his own judgment. The emergency director should maintain a broad understanding of the actual status of the plant, plant capabilities and vulnerabilities and key accident management actions, including their off-site effects.	needed.				
35	3.137	Validation should include an independent, A cross-functional safety review of the plant should be performed with the objective of fully understanding all accident management implications. This review should incorporate a plant walk-down ⁸⁹ for assessing which kind of difficulties could exist for practical implementation of accident management measures, in particular in case of an <u>external extreme</u> event, including seismically induced fires and floods⁹⁰.	The sentence should be adapted (two verbs). Such a review should not be part of the validation but it should be done at the implementation. “Independent” is too prescriptive. “External” should replace “extreme” (see comment 27).	Deleted			To clarify the para.
36	3.138	All Equipment <u>needed</u> in the accident management programme, including portable and mobile equipment, should be analysed or tested, or other reasonable means used, <u>accordingly with the safety significance of equipment,</u> to verify that performance conforms to the <u>expected function</u> requirements. Testing should include the	Introduction of safety significance concept for equipment as suggested for §3.85. Test is possible only for equipment which can be put on a test bench. That is not the case for instance for the piping and associated	Replaced			To clarify the para.

		<p>equipment and the assembled sub-system needed to meet the planned performance. Tests should include needed local actions, contingencies, and its proper connection to plant equipment, access to the site, off-site actions, multi-unit events, emergency lighting, etc., and the time needed for these actions, <u>if possible</u>. Guidance should be provided for maintenance and periodic testing to assure proper functioning.</p>	<p>equipments where analysis is the only mean. The term “requirements” is too prescriptive for all equipment. The term “if possible” is added for what should include the tests: the list is very prescriptive and may not be feasible practically. The evaluation of equipment should be performed only for equipments that are required in the safety demonstration, even extended to the more probable severe accidents (which corresponds to the requirements of SSRs). This correspond to the need to ensure a more robust response to the most frequent events. Other equipment may be used, but in this case no verification of performance is needed (to be consistent with Table 1). If there is a requirement, it should be limited to check that use of these equipment may not worsen the situation. If recommendations are unduly strong, AMP will</p>				
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			in practice use only the fully tested equipment, and this may be not beneficial to safety				
37	3.139	Staff involved in the validation of the procedures and guidelines should be different from those who developed the procedures and guidelines. Developers/Writers of plant specific procedures and guidelines should prepare appropriate validation scenarios and <u>their participation</u> should participate as observers to the validation process <u>may be beneficial</u> ⁹¹ .	Practically, the participation of developers/writers might not be possible (retirement, change of function in company...), and is not needed.	Replaced			To clarify the para.
38	3.163	The analysis should be comprehensive enough to address all phenomena (thermohydraulic, structural) important for assessment of challenges to integrity of barriers against releases of radioactive materials as well as for <u>source term</u> assessment of potential radiological consequences of reactor accidents (in term of doses) . Multi-unit accidents should be analysed where applicable.	“Potential radiological consequences of reactor accidents (in term of doses)” should be replaced by “source term assessment” which is related to level 2 PSA (assessment of dose is related to level 3 PSA)	Replaced			To delete the redundancy
39	3.167	Use of generic plant analysis, if available, may provide valuable contribution to the analysis, but in such case <u>the applicability of the generic analysis for the specific plant should be justified</u> it should be convincingly demonstrated that the generic analysis is applicable for the specific plant.	The term “demonstrated” is replaced by “justified”: a demonstration may require a comparison between generic and plant specific analysis (what is too prescriptive).	Added			To clarify the para.

40	3.168	<p>In the analysis of accident scenarios that would lead to core damage and subsequent potential challenge to fission products barriers¹⁰² the following aspects should be taken into account:</p> <p>Consideration should be given to sequences with no operator action or inappropriate operator actions (errors of omission or errors of commission) <u>leading to core damage</u>;</p> <p>Further on, the availability and functionality of equipment, including instrumentation, and the habitability of working places under anticipated environmental conditions should be considered; and</p> <p><u>Cliff-edge effects should be identified and they should be considered in the strategies</u> This process should demonstrate that proposed strategies are not sensitive to cliff edge effects.</p>	<p>Inappropriate error actions are usually only dealt with before core damage.</p> <p>Demonstration of the absence of cliff-edge effects is too strong (this is going far beyond stress tests or SSR 2.1 or 2.2 requirements). The sentence proposed is more consistent with stress tests requirements.</p>	Added			To clarify the para.
41	3.169	<p>The analysis should provide sufficient input for development of procedures and guidelines, in particular:</p> <p>choice of symptoms for diagnosis and monitoring the course of the accidents including confirmation of choice of symptoms for long term processes,</p> <p>identification of the key challenges and vulnerable plant systems and barriers,</p>	<p>The list is going too far (proposal of several simplifications in the bullets).</p> <p>The recommendation for equipment and instrumentation upgrades is an objective of PSA (not specific for accident management programme) and should be removed (particularly if</p>	Deleted			To delete redundancy and clarify the para.

		<p>specification of set-points to initiate and to exit individual strategies, positive and negative impacts of accident management actions including, demonstration of effectiveness of the actions, time windows available for performing the actions, prioritisation and optimisation of strategies based on timing and severity of challenges, evaluation of capability of systems to perform intended functions; expected trends in the accident progression (projections of the timing), conditions for leaving SAM domain, recommendations for equipment and instrumentation upgrades, and computational aids development.</p>	<p>management does not consider (probability)</p>	<p>program</p>			
42	3.176	<p>Operating organization should integrate all the elements of the accident management programme <u>with</u>in the <u>exist</u>ing management system so that processes and activities that may affect safety are established and conducted coherently <u>with the</u> protection of site personnel and the public, and protection of the environment.</p>	<p>Some words are missing.</p>	<p>Corrected</p>			<p>To correct typo error</p>
43		<p>Extreme external events</p>	<p>See previous comments</p>	<p>Corrected as “external hazards”</p>			<p>To consistence with relevant safety requirements, SSR 2/1 and 2/2</p>

