DS462

Amendments to the IAEA Safety Requirements:

- GSR Part-1 on Governmental, Legal and Regulatory Framework for Safety
- NS-R-3 on Site Evaluation for Nuclear Installations
- SSR-2/1 on Safety of Nuclear Power plants: Design
- SSR-2/2 on Safety of Nuclear Power plants: Commissioning and Operation
- GSR Part 4 on Safety Assessment for Facilities and Activities

Status
STEP 10: Second internal review

Below the text submitted to the MS for comments, you will find the set of individual comments and then the individual answers

The overall resolution is to be found on the right column, highlighted in yellow

Lessons learned	Current text	Proposal for MS consultation	Proposed resolution of MS comments after NUSSC WG meeting Track changes version, compared to what was submitted to the Member States for comments
Country X Number of the comment	Proposed text	Rationale	**IN THIS VERSION, THE RESOLUTION OF INDIVIDUAL COMMENTS IS NOT UPDATED, i.e the table reflects what was prepared before the NUSSC WG meeting**
Country Y Number of the comment	Proposed text	Rationale	

In some cases, there are proposal for additional amendments not initially proposed by the IAEA. They are highlighted in Blue

Update of Plant State Definition

LL	Current text	Proposal for Member States consultation	Proposed resolution of MS comments
N.A.	DEFINITIONS pg. 59	**Plant states (considered in design)** (a) Operational states: Normal operation; Anticipated operational occurrences Accident conditions: Design basis accidents; Design extension conditions (No core/fuel melt; Severe Accidents (including Core melt)) (a) Conditions practically eliminated	**Plant states (considered in design)** (a) Operational states: Normal operation; Anticipated operational occurrences Accident conditions: Design basis accidents; Design extension conditions (No core/fuel melt without significant corefuel degradation; Severe Accidents (including with core melt) Conditions practically eliminated
	DEFINITIONS pg. 59 **[beyond design basis accident]** This term is superseded by **design extension conditions**.	DEFINITIONS pg. 59 **[beyond design basis accident]** This term is superseded by **design extension conditions.**	DEFINITIONS pg. 59 deleted
	P 60 Design extension conditions Accident conditions that are not considered for design basis accidents, but…… Design extension conditions could include severe accident conditions.	P 60 Design extension conditions Accident conditions that are not considered for design basis accidents, but…… Design extension conditions could include the severe accident conditions not practically eliminated..	P 60 Design extension conditions Postulated Aaccident conditions that are not considered for design basis accidents, but that are considered in the design process of the facility in accordance with best estimate methodology, and for which releases of radioactive material are kept within acceptable limits. Design extension conditions include events without significant fuel degradation and conditions with core melt.the severe accident conditions not practically eliminated.
Germany **SSR-2/1** **1**	P 60 Design extension conditions Accident conditions that are not considered for design basis accidents, but that are considered in the design process of the facility in accordance with best estimate methodology., and for which releases of radioactive material are kept within acceptable limits. Design extension conditions include the severe accident conditions not practically	The radiological consequences for DEC with-out core melt and for DEC with core melt shall be different: • For DEC without core melt the releases shall be kept within acceptable limits. • For DEC with core melt only those re-leases are permitted, which lead to protective measures limited in	Not appropriate for the general definition

	~~eliminated.~~ Radiological consequences for design extension conditions without core melt are kept within acceptable limits and in case of core melt accidents only protective measures limited in area and time are permitted.	area and time (see 2.13 (5)).			
Hungary 1	P 60 Design extension conditions Accident and severe accident conditions that are not considered for design basis accidents, but… ~~Design extension conditions could include the severe accident conditions not practically eliminated.~~	The term “severe accident conditions not practically eliminated” covers all the so-called Beyond Design Extension Conditions as well, which are not to be included in DEC for probabilistic reasons.			See resolution for USA 9
USA 8 Case (RES)	Plant states: Under Design extension conditions change “No core melt” to “Multiple failure events with no core melt.”	The concept that DECs include successfully mitigated multiple failure events in an important consideration when explaining this concept.		X	
USA 9 Case (RES)	Modify last sentence to read, “Design Extension Conditions include multiple failure events and the severe…”	Clarity. The sentence omits a major part of the DEC regime.		See new proposal	
Russia 10	Definitions of p. 59, Diagram of plant conditions (considered in the design)	The diagram of plant states (to be considered in design) presented in the proposed amendments is based on the concept of a practically eliminating of plant event sequences which can lead to unacceptable radiation consequences. Thus practically eliminating is understood as 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 arise. According to this concept on the presented diagram of plant states the conditions considered in the design and conditions practically eliminated are allocated. The concept of an exception of consideration in the design of events because of their low probability existed in Soviet Union before Chernobyl accident. Such accidents were called hypothetical owing to their very small probability. Chernobyl accident has denied viability of this concept. In this connection the concept of the NPP safety existing before Chernobyl accident has been completely reconsidered, and any accident irrespective of their probability began to be considered in designs in this or that kind. Accident Fukushima Daiichi NPP has once again confirmed unacceptability of the concept of an exception of consideration in the design of events on the basis of representations about their low probability even if it is considered that these representations have a high level of confidence. We propose to exclude from this standard the concept of an elimination of consideration in the design of			Accident management should include, to a reasonable extend, possibilities to minimize the consequences of events not considered in the reference design of the plant, by anticipating needs for mobile equipment and facilitating their use. But relying on off-site supports means that the plant was not explicitly designed to cope with any possible event irrespective of its probability.

		events on the basis of representations about their low probability. All physically possible events should be considered in the design irrespective of their probability. However the way how extremely improbable events are considered in design is developing organizational measures relevant to level 5 of defence in depth while more probable events also technical and organizational measures relevant to level 4 of defence in depth shall be developed.			
Russia **SEC NRS** **1**	Definitions of p.59, Diagram of plant conditions (considered in design) “Non severe accidents”(instead of wording “no core melt”)	Wording Clarification is necessary since Severe accidents can happen outside reactor core (e.g. severe accidents in spent fuel pool are possible).			See resolution for USA 9
Ukraine **5**	p.59 Definitions Design extension conditions No core damage | Core damage (severe accident)	Editorial			New figure
Ukraine **6**	p.60 Definitions Design extension conditions Accident conditions that are not considered for design basis accidents due to their extremely low probability, but that are considered in the design and/or in the safety analysis report of the facility in accordance with best estimate methodology and for which releases of radioactive material are kept within acceptable limits. Design extension conditions shall include the severe accident conditions if core damage is not practically eliminated by design features.	Editorial			See resolution for USA 9
Poland **2**	P 59 (a) Conditions practically eliminated (see footnote 1).	To define plant conditions that are not included in the plant design basis.			Figure has been modified
Poland 3	P 59 and 60 (b) Design extension conditions without core melt include, but are not limited to, conditions such as: anticipated transients without scram, station black-out and containment bypass accidents.	To clarify of and provide minimum requirements on DECs which were marked as “No core melt” (see for instance EUR sec. 2.1.4.3.2).			See USA resolutions for 8 and 9. Examples of DEC which should be considered will be indicated in the Safety Guides
ENISS 1	Definition	The DEC were not “considered in design” for existing plants			SSR2/1 provides up to date

WNA 1	**Plant states ~~considered in design~~**				requirements r
ENISS 2 **WNA 2**	Definition [beyond design basis accident] This term is superseded by design extension conditions.	It is not clear, why this explanatory description was deleted, as it is important to foster understanding of the new concept described in SSR2/1 – furthermore we do not see a link to the Fukushima lessons learnt. Notion of DECs has also been endorsed for existing plants by WENRA. **Homogeneity of the vocabulary is an important step to common understanding**.			There are still some accidents which are not considered for design.
WNA 3	p. 60 Design extension conditions Accident conditions that are not considered for design basis accidents, but…... Design extension conditions ~~could~~ include ~~the~~ severe accident conditions ~~not practically eliminated.~~	DEC defines certain unlikely severe accident conditions. These are only those severe accidents that can lead to unacceptable consequences and that have to be eliminated in a practical manner. Once they are eliminated, they “disappear” from the safety case. Therefore, the words “not practically eliminated” are not necessary.			See resolution for USA 9
Canada **30**	Definition plant state Replace figure with one provided below	The revised figure more correctly captures the delineation between design basis, beyond design basis, design extension condition, etc. It also highlights that the key distinguishing feature is event probability.			See new figure

plant states (and associated design regime) ~~(considered in design)~~

<table>
<tr><td colspan="2">Operational states</td><td colspan="4">Accident conditions</td><td>→</td></tr>
<tr><td rowspan="3">Normal operation</td><td rowspan="3">Anticipated operational occurrence</td><td rowspan="3">Design-basis accident</td><td colspan="3">Beyond-design-basis accidents</td><td>→</td></tr>
<tr><td colspan="2">Design extension conditions</td><td>Practically eliminated conditions</td><td>→</td></tr>
<tr><td>No severe fuel degradation</td><td colspan="2">Severe accidents</td><td>→</td></tr>
<tr><td colspan="3">Design basis</td><td colspan="2">Design extension</td><td>Not considered as design extension</td><td>→</td></tr>
</table>

Reducing frequency of occurrence →

LL	Current text	Proposal for Member States consultation	Proposed resolution of MS comments		
Canada 1, 2, 3, 4, 5 and 23	• Formatting of lists needs to be corrected. There is no space between the number and the text and no indent. This includes (a), (b), (c) lists, (1), (2), (3) lists and the references. • Reference to footnotes by number is incorrect. Check all "see footnote x" • Preface, para 4, footnote 1: Footnote reference should be superscript. • Preface para 7: Add space between "IAEA Safety Requirements:" and "GSR Part-1". Also, there are formatting anomalies. • 1.1, line 4: Change "sadfety" to "safety" • Requirement 55: Change "imlplemented" to "implemented"(Secretariat: maybe this for for requirement 67 instead of requirement 55)	Editorial comments	**Will be considered**		
		No initial IAEA proposal			
Germany **SSR-2/1** **2**	1.2 ~~The designs of~~ many Many existing nuclear power plants, as well as the designs for new generation of nuclear power plants, have been enhanced to include additional measures to prevent or mitigate the consequences of complex accident or severe accident sequences involving multiple failures of components. Complementary or additional systems and equipment with new capabilities have been backfitted to many existing nuclear power plants as part of their accident management programmes 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 generation nuclear power plants now explicitly includes the consideration of severe accident scenarios and strategies for their management. Often specialised or passive systems have been implemented for these reasons. Within this safety guide the term "severe accident (conditions)" is replaced by "design extension conditions" and the term "accident or accident conditions" comprise the former terms	This text should be enlarged to be fully in accordance with the current state of the plants – operating ones and next generation plants – and the new definitions (accidents, design extension conditions) explained first much later in this safety guide (Requirement 13). The text was so far in accordance with the "old" terminology used worldwide for accidents and severe accidents. The later one might be inside the plant design (next generation of NPPs) or outside (all operating NPPs of the current generation). If severe accidents have not been considered in the plant design (severe) accident management programmes have been implemented to upgrade the plant's safety (not its design as mentioned!) by SAMG, extra AM hardware etc. as described here and in IAEA NS-G-2.15. There is no reason to change this generally agreed issue. Modifications are proposed to make this clear just in the BACKGROUND of the report using the new definitions.	IAEA Safety Standards are periodically reviewed and updated as necessary to reflect up to date knowledge, state of technology and operating feedback. The proposed updates of the SSR 2/1 requirements follow this policy. Moreover, IAEA design requirements are therefore primarily established for new builds and to be used as a reference basis for the safety review of the plants in operation, and consequently, cannot be formulated differently for new plants and for plants in operation.		

	"design basis accidents" and "severe accidents". Requirements related to the State system of accounting for, and control of, nuclear material and security related requirements are also taken into account in the design of nuclear power plants. Integration of safety measures and security measures will help to ensure that neither compromises the other.				
		No initial IAEA proposal			
Canada **6**	1.3 final sentence: Change to "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 existing design is adequate or if the safe operation of the plant could be further enhanced by means of reasonably practicable safety improvements."	As written, it is implied that the utilities must always be looking for further enhancements. The revised wording gives the option of demonstrating the adequacy of the current design when evaluating against modern codes and standards.			**To be considered in the next full revision**
		No initial IAEA proposal			
Germany **SSR-2/1** **3**	2.8 (c) To ensure that ~~the likelihood of occurrence of an accident with serious radiological consequences is extremely low and that the radiological consequences of such an accident would be mitigated to~~ ~~**the fullest extent practicable**~~. plant event sequences that could result in high radiation doses or radioactive releases must be practically eliminated[1] and that plant event sequences with a significant frequency of occurrence must have no or only minor potential radiological consequences. An essential objective is that the necessity for off-site intervention measures to mitigate radiological consequences be limited or even eliminated in technical terms, although such measures might still be required by the responsible authorities. footnote 1): 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 arise.	The term "to the fullest extend" at the end of the sentence is undefined. Further, the request should be changed against the new radiological requirement, which is added in the current proposal under 2.11. It would fit better here and would be more logical if this new requirement is already mentioned here under 2.8 (c) replacing the old text. See also proposal on 5.31 and 5.31 a.			**To be considered in the next full revision**
		No initial IAEA proposal			

Germany **SSR-2/1** **4**	2.10 Measures shall be taken to control exposure for all operational states at levels that are as low as reasonably achievable and to minimize the likelihood of an accident that could lead to the loss of control over a source of radiation. Nevertheless, there will remain a possibility that an accident could happen. Measures shall 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 as part of the plant design, or the establishment of accident management procedures for plants not designed for. This has to be done by the operating organization and, should possibly include, the establishment of off-site intervention measures by the appropriate authorities, supported as necessary by the operating organization, to mitigate exposures if an accident has occurred.	The text should be more precise related to the new term "accident", which includes no severe accidents by definition. Such are not in the design of current NPPs! The para. 2.10 is listed under the headline SAFETY IN DESIGN, but it clearly indicates as well accident management measures being outside the NPPs design. A differentiation is proposed between those measures included in the design (next generation NPPs) ore as part of accident management (current generation NPPs).			**The original text is considered to be adequate**
		No initial IAEA proposal			
Germany **SSR-2/1** **5**	2.11 The design for safety of a nuclear power plant applies the safety principle that practical measures must be taken to mitigate the consequences for human life and health and the environment of nuclear or radiation incidents (Ref. [1], Principle 9)~~ plant event sequences that could result in high radiation doses or radioactive releases must be practically eliminated[1] and plant event sequences with a significant frequency of occurrence must have no or only minor potential radiological consequences. An essential objective is that the necessity for off-site intervention measures to mitigate radiological consequences be limited or even eliminated in technical terms, although such measures might still be required by the responsible authorities.~~	Second part of the text should be deleted here as it is proposed to move it to 2.8 (c). If not, the second part should start with *"In addition, accident conditions that could result … "* as it is not linked to principle 9 of [Ref. 1]			**To be considered in the next full revision**
Canada **7**	2.11 footnote 2 Change to "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~~ reasonable level of confidence to be extremely unlikely to arise."	The use of "high confidence" in the definition of "practically eliminated" is incompatible with the concept of Design Extension Conditions. See 5.27: "the design of the plant is such as to prevent accident conditions not considered design basis accident conditions, or to mitigate their consequences, **as far as is reasonably practicable**." and "The effectiveness of provisions to ensure the functionality of the containment could be analysed on the basis of			**To be considered in the next full revision** **Work to better clarify the concept of practically elimination is in progress at the IAEA**

	Or, add to glossary: “practically eliminated The possibility of certain conditions being physically impossible or with a reasonable level of confidence to be extremely unlikely to arise”	the **best estimate approach**.” It would also be better to add the term to the glossary to avoid frequent references to the footnote			
21.1	**Defence in depth** 2.13. Application of the concept of defence in depth in the design of a nuclear power plant provides several levels of defence (inherent features, equipment and procedures) aimed at preventing harmful effects of radiation on people and the environment, and ensuring adequate protection from harmful effects and mitigation of the consequences in the event that prevention fails. The independent effectiveness of each of the different levels of defence is an essential element of defence in depth at the plant and this is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels. There are five levels of defence:	**Defence in depth** 2.13. Application of the concept of defence in depth in the design of a nuclear power plant provides several levels of defence (inherent features, equipment and procedures) aimed at preventing harmful effects of radiation on people and the environment, and ensuring adequate protection from harmful effects and mitigation of the consequences in the event that prevention fails. ~~The independent effectiveness of each of the different levels of defence is an essential element of defence in depth at the plant and this is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels.~~ There are five levels of defence:	**Defence in depth** . ~~2.13. Application of the concept of defence in depth in the design of a nuclear power plant provides several levels of defence (inherent features, equipment and procedures) aimed at preventing harmful effects of radiation on people and the environment, and ensuring adequate protection from harmful effects and mitigation of the consequences in the event that prevention fails.~~ 2.13 Paragraph 3.31 of the safety fundamentals SF/1 states that *“Defence in depth is implemented primarily through the combination of a number of consecutive and independent levels of protection that would have to fail before harmful effects could be caused to people or to the environment. If one level of protection or barrier were to fail, the subsequent level or barrier would be available. The independent effectiveness of the different levels of defence is ~~an essential~~ a necessary element of defence in depth”*. There are five levels of defence:		
Finland **SSR-2/1** **1**	2.13. Application of the concept of defence in depth in the design of a nuclear power plant provides several levels of defence (inherent features, equipment and procedures) aimed at preventing harmful effects of radiation on people and the environment, and ensuring adequate protection from harmful effects and mitigation of the consequences in the event that prevention fails. There are five levels of defence.	This text needs to be clarified. The first sentence refers to four levels of defence. The fifth level is emergency preparedness.		See new proposal. Text from IAEA Safety Fundamentals, Principle 8 (for consistency between IAEA publications)	
Russia **SEC NRS** **2**	2.13 Application of the concept of defence in depth in the design of a nuclear power plant provides several levels of defence (inherent features, equipment and procedures) aimed at preventing harmful effects of radiation on people and the environment, and ensuring adequate protection from harmful effects and mitigation of the consequences in the event that prevention fails. The independent effectiveness of each of the different levels of defence is an essential element of defence in depth at the plant and this is achieved by incorporating measures to avoid the failure of	We propose to remain sentence devoted to independence of different levels of Defense-in-Depth. To our mind this demand is one of cornerstone of defense in depth.		See new proposal.	

	one level of defence causing the failure of other levels. There are five levels of defence:				
Canada 8	2.13 The text should align with the IAEA INSAG-10 on defence in depth. Table 1 from INSAG-10 may be a useful addition to repeat in this document to ensure that alignment. It would also be prudent to clarify the fourth level of defence in 2.13 including text from INSAG-10: "Control of severe plant conditions, including prevention of accident progression and mitigation of the consequences of severe accidents"	It is important to have alignment within the document set. INSAG-10 is the parent document for defence in depth. This will avoid potential confusion between defence levels 3/4/5.		**Alignment with SF1**	
UK 6	2.13 The independent effectiveness of each of the different levels of defence is an essential element of defence in depth at the plant	Why has this sentence been removed? This is an important part of defence in depth. Please reinstate.		See new proposal.	
21.1	2.13. … (4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. The most important objective for this level is to ensure the confinement function, thus ensuring that radioactive releases are kept as low as reasonably achievable. (5) The purpose of the fifth and final level of defence is to mitigate the radiological consequences of radioactive releases that could potentially result from accidents accident conditions. …	2.13. … (4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. Level four is aimed at preventing the progression of the accident and mitigating the consequences of a severe accident. In case of a severe accident, the most important objective for this level is to ensure the confinement function by limiting the radiological releases so that the protection of the people and environment is ensured by implementing protective measures limited in time and areas. Level four includes additional features which are necessary for the practical elimination of sequences possibly leading to significant radioactive releases (footnote) Footnote: "Significant radioactive releases": Large or early releases for which protective measures limited in area and time are insufficient to protect the people and the environment. (5) The purpose of the fifth and final level of defence is to mitigate the radiological consequences of radioactive releases that could potentially result from accidents …..~~conditions~~ 2.13 a The independent effectiveness of the different levels of defence is an essential element of defence in depth at the plant and is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels. Independence shall be implemented as far as practicable with a particular attention for levels three and four because of the	2.13. (4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. Level four is aimed at preventing the progression of the accident and mitigating the consequences of a severe accident. The safety objective ~~I~~in case of a severe accident is that only ~~, the most important objective for this level is to ensure the confinement function by limiting the radiological releases so that the protection of the people and environment is ensured by implementing~~ protective measures limited in time and areas are necessary and that off-site contamination is avoided. ~~Level four includes additional features which are necessary for the practical elimination of s~~Sequences which ~~possibly~~ lead~~ing~~ to large or early~~significant~~ radioactive releases (footnote) have to be practically eliminated. (5) The purpose of the fifth and final level of defence is to mitigate the radiological consequences of radioactive releases that could potentially result from accidents ….. Foot note : ~~"Significant radioactive releases": Large or early releases for which protective measures limited in area and time are insufficient to protect the people and the environment.~~ *Large radioactive release: release for which off-site protective measures limited in time and area are insufficient to protect the people and the environment.* *Early radioactive release: release for which off-site protective measures are necessary but unlikely to be fully effective in due time.* ~~2.13 a The independent effectiveness of the different levels of defence is an~~		

		enhanced severity of overall consequences if failures of these two levels occur simultaneously.	~~essential element of defence in depth at the plant and is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels. Independence shall be implemented as far as practicable with a particular attention for levels three and four because of the enhanced severity of overall consequences if failures of these two levels occur simultaneously.~~ *2.13 a) is deleted but replaced by the following requirements to be added to Requirement 7* **Requirement 7: Application of defence in depth** **The design of a nuclear power plant shall incorporate defence in depth. The levels of defence in depth shall be independent as far as is practicable.** *4.13 a) The levels of defence in depth shall be independent as far as is reasonably practicable to avoid that a failure of one level impairs the effectiveness of other levels. In particular safety features for -design extension conditions (especially features to mitigate fuel melt accidents) shall be independent as far as is reasonably practicable from the safety systems*		
Germany **SSR-2/1** **6**	(2)The purpose of the second level of defence is to detect and control deviations from normal operational states in order to prevent anticipated operational occurrences at the plant from escalating to accident conditions. This is in recognition of the fact that postulated initiating events are likely to occur over the operating lifetime of a nuclear power plant, despite the care taken to prevent them. This second level of defence necessitates the provision of specific systems and features in the design, the confirmation of their effectiveness through safety analysis, and the establishment of operating procedures to prevent such initiating events, or else to minimize their consequences, and to return the plant to a safe state. (3)For the third level of defence, it is assumed that, although very unlikely, the escalation of certain anticipated operational occurrences or postulated initiating events might not be controlled at a preceding level and that an accident could develop. In the design of the plant, such accidents are postulated to occur. This leads to the requirement that inherent and/or engineered safety features, safety systems and procedures be provided that are capable of preventing damage to the reactor core or significant off-site releases and returning the plant to a safe state. (4) ~~The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. Level four is aimed at preventing the progression of the accident and mitigating the consequences of a severe accident. In case of a severe accident, the most important objective for this level is to ensure the confinement~~	The logic under (2) seems to be no longer really clear, as the term "accident conditions" is used now for both design basis accidents and design extension conditions (= severe accidents). What is meant here – probably not severe accidents as well? Nevertheless no modification was proposed here as it might get clear from the full content of the para. The wording under (4) must be made in agreement with the new definitions. To avoid the term severe accident the term design extension conditions is consequently used. This requires a distinction between DECs with and without core degradation (severe fuel damage). Fuel melting in spent fuel pools should be clearly included into the scope of the		See new proposal	Significant fuel degradation in the spent fuel storage is not considered as a DEC in Req. 6.68, because expected to be practically eliminated. Technical Support Centre and emergency control centre fulfil different functions. Design extension conditions are defined as ~~as~~ the set of multiple failure events retained for design. The EPR is for any accident requiring the implementation of

	~~function by limiting the radioactive releases so that the protection of the people and environment is ensured by implementing protective measures limited in time and areas. Level four includes additional features which are necessary for the practical elimination of sequences possibly leading to significant radioactive releases2.~~ The purpose of the fourth level of defence is to deal with accidents that result from failure of the third level of defence in depth. Level four is aimed at a) preventing severe fuel damage in the core or in the spent fuel storage and b) mitigating the consequences of design extension conditions with severe fuel damage either in the reactor core or in the spent fuel storage pool. In case of a design extension conditions with severe fuel damage either in the reactor core or in the spent fuel storage pool, the most important objective for this level is to ensure the confinements function by limiting the radioactive releases so that the protection of the people and environment is ensured by implementing protective measures limited in time and areas. Level four may include additional features which are necessary for the practical elimination of sequences possibly leading to significant radioactive releases[3]. (5)The purpose of the fifth and final level of defence is to mitigate the radiological consequences of radioactive releases that could potentially result from ~~accidents~~ design extension conditions. This requires the provision of an adequately equipped technical support centre (named emergency ~~control~~ centre sometimes) and emergency plans and emergency procedures for on-site and off-site emergency response. Foot note 3 "Significant radioactive releases": Large or early releases for which protective measures limited in area and time are insufficient to protect the people and the environment.	requirement. Level 4 may include features which are necessary for the practical elimination, but not necessarily and not additionally. The wording under (5) must be made in agreement with the new definitions. The name "emergency control center" was changed into "technical support center" in Requ.67 in this SSR-2/1. In Requirement 67 and Para 6.42 of SSR-2/1, the term "emergency control centre" is replaced by "technical support centre". In order to ensure con-sistency throughout the document, the new term should also be used here. Furthermore, the revised terminology is consistent with Para 6.27 of GSR Part 7, too.			protective measures
Belgium **2**	2.13 ... (4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. Level four is aimed at preventing the progression of the accident and mitigating	To make it more clear that this refers to level 5 protective measures in the emergency response (and not level 4 measures)	See new proposal		

2 "Significant radioactive releases": Large or early releases for which protective measures limited in area and time are insufficient to protect the people and the environment.

	the consequences of a severe accident. In case of a severe accident, the most important objective for this level is to ensure the confinement function by limiting the radiological releases so that the protection of the people and environment is ensured by implementing emergency preparedness ~~protective~~ measures limited in time and areas. Level four includes additional features which are necessary for the practical elimination of sequences possibly leading to significant radioactive releases (footnote)				
Hungary 2	2.13 (4) …. In case of a severe accident, the most important objective for this level is to ensure the confinement function by limiting the radiological releases so that the protection of the people and environment is ensured by implementing protective measures limited in ~~time and areas~~ space and time.	Appropriate wording.			English
Russia 11	2.13 (4) last sentence Level four includes additional features which are necessary for decrease of the probability of ~~the practical elimination of~~ sequences ~~possibly~~ leading to significant radioactive releases to the lowest achievable level	Proposal has the aim to avoid usage of uncertain term "practical elimination"			"Practical elimination" is preferred (new concept)
Canada 9	2.13 (4) line 6 "In case of a severe accident, the most important objective for this level is limiting ~~the~~radioactive releases ~~to ensure~~ by ensuring the confinement function. The protection of people and the environment is ensured by implementing protective measures that are limited in time and area."	The logic in the first part is backwards – radioactive releases are limited by ensuring containment function, not the other way round. The sentence is unclear, contains errors and is too long.		See new proposal	
UK 7	2.13 (4) "Level four is aimed at preventing the progression of the accident and mitigating the consequences of a severe accident. In case of a severe accident, the primary objective for level 4 is to maintain the confinement function to limit the radiological releases so that the protection of the people and environment is ensured ~~by implementing protective measures limited in time and areas.~~"	I am unclear what "by implementing protective measures limited in time and areas" really means please clarify or delete this text.		Agreed but this concept is qualitative and used in other Safety Standards published by the Agency.	
France 1	2.13 (3) In the design of the plant, such accidents are postulated to occur. This leads to the requirement that inherent and/or engineered safety features, safety systems and procedures be provided that are capable of preventing damage to the reactor core or radiological impacts, on or off the site exceeding only minor impact, ~~significant off-site releases~~ and returning the plant to a safe state	According to new footnote of 2.13 (4), significant releases are "large or early releases". Thus, without modification, the paragraph for DiD level 3 is contradictory with requirement 19-5.25 : "A primary objective shall be to manage all design basis accidents so that they have no, or only minor, radiological impacts, on or off the site, and do not necessitate any off-site intervention measures"			No change to 2.13 (3)
France 2	2.13 (4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from	If multiple failures are considered in DiD level 4, it could be understood that there is no necessary independency between provisions for multiple failures		See new proposal.	

	failure of the third level of defence in depth. Level four is aimed at preventing the progression of the accident **to a severe accident** and mitigating the consequences of a severe accident **should it occur**. In case of a severe accident, the most important objective for this level is to ensure the confinement function. **The safety objective in case of severe accident is that only protective measures limited in time and area are necessary and that long term off-site contamination is avoided.** Level four includes additional features which are necessary for the practical elimination of sequences possibly leading to significant radioactive releases	and provisions for severe accident. Thus, proposal to mention failure of multiple failures provisions. The second proposal aims at highlighting that, due to enhancement of confinement, there should be sufficient time to implement measure.			
Indonesia 2	(4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. Level four is aimed at preventing the progression of the accident and mitigating the consequences of a severe accident. In case of a severe accident, the most important objective for this level is to ensure the confinement function by limiting the radiological releases so that the protection of the people and environment is ensured. by implementing protective measures limited in time and areas. Level four includes additional features which are necessary for the practical elimination of to eliminate any possible consequences possibly leading to significant radioactive releases (footnote) 2.13 a The independent effectiveness of the different levels of defense is an essential element of defense in depth at the plant and is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels. Independence shall be implemented as far as practicable practicably with a particular attention for levels three and four because of the with regard to the enhanced severity of overall consequences if failures of these two levels occur simultaneously.	Redundant expression . To make strong sentence grammatical error grammatical error	See new proposal 2.13 a is rephrased and moved under the umbrella of Requirement 7.		
WNA 4	2.13 (4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. Level four is aimed at preventing the progression of the accident <u>to severe accident</u> and mitigating the consequences of a severe accident. In case of a severe accident, the most important objective for this level is to ensure <u>so far as is reasonable practicable</u> the confinement function<u>. The</u>	"can" only be ensured. The term "significant" is not already defined in the IAEA Glossary (The exact definition of 'significant…' would be a regulatory decision.) Some people might consider any release above acceptable limits as significant which is not appropriate.	See new proposal		

	safety objective in case of severe accident is that only protective measures limited in time and area are necessary and that long term off-site contamination is avoided. Sequences which lead to large and early radiological releases have to be practically eliminated. by limiting the radiological releases so that the protection of the people and environment is ensured by implementing protective measures limited in time and areas. Level four includes additional features which are necessary for the practical elimination of sequences possibly leading to significant radioactive releases (footnote) ... Footnote: "Significant radioactive releases": Large or early releases for which protective measures limited in area and time are insufficient to protect the people and the environment.	The proofed terms "early or large releases" and "long term off site contamination" should be used. Not only level four includes features for practical elimination (e.g. practical elimination of RPV relies on provisions in level 1)			
ENISS 3	2.13 (4) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. Level four is aimed at preventing the progression of the accident and mitigating the consequences of a severe accident. In case of a severe accident, the most important objective for this level is to ensure so far as is reasonably practicable the confinement function. The safety objective in case of severe accident is that only protective measures limited in time and area are necessary and that long term off-site contamination is avoided. Sequences which lead to large or early radiological releases have to be practically eliminated. by limiting the radiological releases so that the protection of the people and environment is ensured by implementing protective measures limited in time and areas. Level four includes additional features which are necessary for the practical elimination of sequences possibly leading to significant radioactive releases (footnote)	It is not possible to ensure containment function for every conceivable fault sequence "Significant release" is a new notion: we should not multiply them. Use "early or large releases" and "long term off site contamination" Not only level four includes features for practical elimination (e.g. practical elimination of RPV relies on provisions in level 1).		See new proposal. "shall" is not used but "the objective is to maintain…"	
ENISS 4	2.13 (5) (5) The purpose of the fifth and final level of defence is to mitigate the radiological consequences of radioactive releases that could potentially result from accidents …..conditions . Footnote: "Significant radioactive releases": Large or early releases for which protective measures limited in area and time are insufficient to protect the people and the environment.	"Conditions" is crossed over in IAEA proposal (table) not in the complete text See 2.13 (4)	"…from accidents" is correct		

Belgium **3**	2.13 a The independent effectiveness of the different levels of defence is an essential element of defence in depth at the plant and is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels. Independence shall be implemented as far as practicable ~~with a particular attention for levels three and four because of the enhanced severity of overall consequences if failures of these two levels occur simultaneously.~~	Independence of all levels of defence is considered as important. There is a preference not to stress a specific case			See resolution for Hungary 3
Hungary **3**	2.13 a The independent effectiveness of the different levels of defence is an essential element of defence in depth at the plant and is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels. Independence shall be implemented as far as practicable. ~~with a particular attention for levels three and four because of the enhanced severity of overall consequences if failures of these two levels occur simultaneously.~~	The deleted passage declares that the first three levels are not as important as the third and fourth levels from an independence point of view. This approach suggests that the first three levels are 'negligible', as the third and the fourth levels envelop them. A fundamental task of the individual levels is to prevent the escalation of any conditions differing from normal operation conditions to a point where the activation of the subsequent level is necessary. Consequently, the general safety approach requires the five levels to be handled equally weighted regarding each and every point of view.	A full independence between all the levels of defence is unrealistic and could lead to excessive complexity of the design. Nevertheless requesting a high independence between level 3 (safety systems for DBAs) and level 4 (safety features to mitigate the consequences of a core melt accident) is essential for the protection of the people.		
Russia **SEC NRS** **3**	2.13 a The independent effectiveness of the different levels of defence is an essential element of defence in depth at the plant and is achieved by incorporating measures to avoid the failure of one level of defence causing the failure of other levels. Independence shall be implemented as far as practicable ~~with a particular attention for levels three and four because of the enhanced severity of overall consequences if failures of these two levels occur simultaneously.~~	We propose to eliminate „with a particular attention for levels three and four because of the enhanced severity of overall consequences if failures of these two levels occur simultaneously." To our understanding ensuring independence among other levels of DiD is not less important tan independence of levels 3&4.			See resolution for Hungary 3
France 3	2.13 a footnote Footnote: "Significant radioactive releases": Large ~~or early~~ releases for which protective measures limited in area and time are insufficient to protect the people and the environment or early releases for which protective measures are unlikely to be fully implemented in due time.	Clarification To be consistent with Requirement 20 and 5.31 It could also be worth to ensure that this use of "significant releases" is consistent with other IAEA publications (i.e. as always the same meaning).	"" Significant release" is systematically replaced by "early or large release"		
		No initial IAEA proposal			

Pakistan **1**	2.14 At the end of 2.14 following sentence may be added *"The barriers shall, typically for water-cooled reactors, be in the form of the fuel matrix, the fuel cladding, the reactor coolant system pressure boundary and the containment."*	This may be added as guidance for better understanding of readers since lot of guidance is provided in the safety standards requirements			More appropriate for a Safety Guide
		No initial IAEA proposal			
Germany **SSR-2/1** **7**	3.6 (a) That the plant design is fit for purpose and meets the requirement for the optimization of protection and safety by keeping radiation risks as low as reasonably achievable (see 2.8 (c));	Reference to the new requirement should be made.			**To be considered in the next full revision**
	4.20 (c) The facilities necessary for the treatment and storage of radioactive waste generated in operation and provision for managing the radioactive waste that will be generated in the decommissioning of the plant.	No initial IAEA proposal but an agreement that this will be considered after MS consultation	**Revised para. 4.20** (c) The facilities necessary for the processing (pretreatment, treatment and conditioning) and storage of radioactive waste generated in operation and provision for managing the radioactive waste that will be generated in the decommissioning of the plant."		
Germany **SSR-2/1** **8**	4.20 "In particular, the design shall take due account of: ... (c) The facilities necessary for the processing (pretreatment, treatment and conditioning) and storage of radioactive waste generated in operation and provision for managing the radioactive waste that will be generated in the decommissioning of the plant."	Ensuring consistency with the General Safety Requirements No. GSR Part 5 "Predisposal Management of Radioactive Waste", see Paras 1.2, 1.4 and 1.12. According to the IAEA Safety Glossary (2007 Edition), the term 'processing' includes 'pretreatment', 'treatment' and 'conditioning'.	**Accepted for consistency with other Safety Standards**		
		No initial IAEA proposal			
Germany **SSR-2/1** **9**	5.1 Plant states shall typically cover: (a)Normal operation; (b)Anticipated operational occurrences, which are expected to	After Fukushima severe accidents in the SFP are to be included.	**See Requirement 6.68 (Reworded by NUSSC-WG)**		

	occur over the operating lifetime of the plant; (c)Design basis accidents; (d)Design extension conditions, including accidents with significant degradation of the reactor core and/or the fuel in the spent fuel pool.				
		No initial IAEA proposal			
Germany **SSR-2/1** **10**	5.2 ~~Criteria shall be assigned~~ Measures or provisions shall be applied to each plant state, such that frequently occurring plant states shall have no, or only minor, radiological consequences and plant states that could give rise to serious consequences shall have a very low frequency of occurrence (see 2.8 (c)).	The content of the para. is not clear. By applying criteria only, plant states with large releases cannot be prevented. Measures or provisions are needed for such. Reference to the new release criteria should be made in addition.			**To be considered in the next full revision**
		No initial IAEA proposal			
Germany **SSR-2/1** **11**	5.5 The postulated initiating events shall be identified on the basis of engineering judgement and a combination of deterministic assessment and probabilistic assessment. A justification of the extent of usage of deterministic safety analysis and probabilistic safety analysis shall be provided, to show that all under realistic assumptions foreseeable events have been considered.	Is seems to be impossible under realistic assumptions / considerations to show that all foreseeable events have been considered? This could e.g. include the consideration of a meteor crash on a NPP. Was this the intention?			"Foreseeable' is considered appropriate and sufficient
		No initial IAEA proposal			
Germany **SSR-2/1** **12**	5.6 The postulated initiating events shall include all under realistic assumptions foreseeable failures of structures, systems and components of the plant, as well as operating errors and possible failures arising from internal and external hazards, whether in full power, low power or shutdown states.	This is related to the comment on 5.5 above. The failures of structures and components etc. depend on the assumed events.			"Foreseeable" is considered appropriate and sufficient

25.2	**Requirement 17: Internal and external hazards** **All foreseeable internal hazards and external hazards, including the potential for human induced events directly or indirectly to affect the safety of the nuclear power plant, shall be identified and their effects shall be evaluated. Hazards shall be considered for determination of the postulated initiating events and generated loadings for use in the design of relevant items important to safety for the plant.** 5.18 Items important to safety shall be designed and located to minimize, consistent with other safety requirements, the likelihood of external events and their possible harmful consequences. 5.22. For multiple unit plant sites, the design shall take due account of the potential for specific hazards giving rise to simultaneous impacts on several units on the site.	**Requirement 17: Internal and external hazards** **All foreseeable internal hazards and external hazards, including the potential for human induced events directly or indirectly to affect the safety of the nuclear power plant, shall be identified and their effects shall be evaluated. Hazards shall be considered when establishing the plant layout and ~~for~~ determinating ~~determination of~~ the postulated initiating events and generated loadings for use in the design of relevant items important to safety for the plant.** 5.15 a (after Requirement 17) this is a move of 5.18 after 5.15. Items important to safety shall be designed and located, considering other safety implications, to limit their exposure to hazards and possible harmful consequences of their failures. ~~5.18 Items important to safety shall be designed and located to minimize, consistent with other safety requirements, the likelihood of external events and their possible harmful consequences.~~	**Requirement 17: Internal and external hazards** **All foreseeable internal hazards and external hazards, including the potential for human induced events directly or indirectly to affect the safety of the nuclear power plant, shall be identified and their effects shall be evaluated. Hazards shall be considered when establishing the plant layout and for ~~determinating~~determining the postulated initiating events and generated loadings for use in the design of relevant items important to safety for the plant.** **5.15 a (after Requirement 17). This is a move of 5.18 after 5.15** Items important to safety shall be designed and located, considering other safety implications, ~~to limit their exposure to hazards and possible harmful consequences of their failures.~~ *to withstand the effects of hazards or to be protected from hazards and common cause failure mechanisms generated by hazards so that safety functions remain effective.* **5.15 b This is a move of 5.22 after 5.15 a** 5.15 b For multiple unit plant sites, the design shall take due account of the potential for specific hazards giving rise to simultaneous impacts on several units on the site		
Germany **SSR-2/1** **13**	**Requirement 17: Internal and external hazards** **All under realistic assumtions foreseeable internal ~~hazards~~ and external hazards, including the potential …………….**	This should be limited to internal and external hazards which are relevant under realistic conditions for the NPP depending on its location. To design a plant for all foreseeable events is not realistic. In 5.17 it is correctly described.			"foreseeable" is appropriate, no clear need to say more.
Hungary **4**	**Requirement 17** **….Hazards shall be considered when establishing the plant layout ~~and for determinating~~ to determine the postulated initiating events and generated loadings for use in the design of relevant items important to safety ~~for the plant~~.**	Appropriate wording.	**Corrected**		
ENISS 5 **WNA 5**	**Requirement 17** **Hazards shall be considered when establishing the plant layout, determining ~~and determinating~~ the postulated initiating events and generated loadings for use in the**	Editorial	**Corrected**		

	design of relevant items important to safety for the plant.				
Ukraine **7**	5.15 a Items important to safety shall be designed and located, considering beyond design basis~~other~~ safety implications, to limit their exposure to hazards and possible harmful consequences of their failures.	Editorial			The location of equipment important to safety is decided taking into account other safety implications as such but not limited to radiation protection aspects
Belgium **4**	Delete 5.15a Keep 5.18 5.18 Items important to safety shall be designed and located to minimize, consistent with other safety requirements, the likelihood of external events and their possible harmful consequences.	The current § 5.18 is preferred. The wording “and their possible harmful consequences” from 5.18 is more general than “and possible harmful consequences of their failures”. Other harmful consequences of the hazards than SSC failures should also be considered.		See new proposal	
Finland **SSR-2/1** **2**	5.15 a (after Requirement 17) Items important to safety shall be designed and located to minimize, consistent with other safety requirements, the likelihood of external events and their possible harmful consequences.	The deleted text in 5.18 is clear. The proposal “Items important to safety shall be designed and located, considering other safety implications, to limit their exposure to hazards and possible harmful consequences of their failures.” requires protection of items no matter what are the consequences of their failure. Different divisions may be physically separated so that e.g. one can be lost, but loss of others is prevented.		See new proposal	
Germany **SSR-2/1** **14**	5.15 a. Items important to safety shall be designed and located, considering other safety implications, to limit their exposure to hazards and possible harmful consequences ~~of their failures~~.	The proposed addition of “of their failures” changes the meaning of the paragraph (originally 5.18). “Harmful consequences” refers to (secondary) effects of hazards and not to consequences of failures of items important to safety.		See new proposal	
UK 8	5.15a Items important to safety shall be designed and located, considering other safety implications, ~~to limit their exposure to hazards and possible harmful consequences of their failures~~ <u>to protect them from hazards and common cause failure mechanisms i.e.</u>	The term “Exposure” is not typically associated with Hazards.	Accepted		

	violent failure of other pieces of equipment.				
		No initial IAEA proposal			
Germany **SSR-2/1** **15**	5.16 The design shall take due account of internal hazards such as fire, explosion, flooding, missile generation, collapse of structures and falling objects, pipe whip, jet impact and release of fluid from failed systems or from other installations on the site. Appropriate features for prevention and mitigation of such hazards shall be provided to ensure that safety is not compromised.	Text in last sentence should be more precise.			**Editorial** **To be considered in the next full revision**
		No initial IAEA proposal			
USA 2 Case (RES)	5.16 Change 5.16 to read, "…safety is not compromised and cliff edge effects are avoided."				**No need to specifically address cliff-edge effects in this requirement**
19.1	**External hazards** 5.17. The design shall include due consideration of those natural and human induced external events (i.e. events of origin external to the plant) that have been identified in the site evaluation process. Natural external events shall be addressed, including meteorological, hydrological, geological and seismic events. Human induced external events arising from nearby industries and transport routes shall be addressed. In the short term, the safety of the plant shall not	**External hazards** 5.17. The design shall include due consideration of those natural and human induced external events (i.e. events of origin external to the plant) that have been identified in the site evaluation process. Natural external events shall be addressed~~, including meteorological, hydrological, geological and seismic events~~. Human induced external events arising from nearby industries and transport routes shall be addressed. Causality and likelihood shall be considered in postulating potential concurrent hazards. In the short term, the safety of the plant shall not be permitted to be dependent on the availability of off-site	**External hazards** 5.17. The design shall include due consideration of those natural and human induced external events (i.e. events of origin external to the plant) that have been identified in the site evaluation process. ~~Natural external events shall be addressed. Human induced external events arising from nearby industries and transport routes shall be addressed.~~ Causality and likelihood shall be considered in postulating potential concurrent hazards. In the short term, the safety of the plant shall not be permitted to be dependent on the availability of off-site services such as electricity supply and firefighting		

	be permitted to be dependent on the availability of off-site services such as electricity supply and fire fighting services. The design shall take due account of site specific conditions to determine the maximum delay time by which off-site services need to be available.	services such as electricity supply and fire fighting services. The design shall take due account of site specific conditions to determine the maximum delay time by which off-site services need to be available.	services. The design shall take due account of site specific conditions to determine the maximum delay time by which off-site services need to be available.		
Germany **SSR-2/1** **16**	5.17. The design shall include due consideration of those natural and human induced external events (i.e. events of origin external to the plant) that have been identified in the site evaluation process to be relevant. …	Text in last sentence should be more precise. Relevant hazards should be considered. Other text is OK.			Hazards to be considered in the plant design are identified and characterized during the site evaluation
Canada **10**	5.17 first sentence Change to "The design shall include due consideration of those natural and human induced external events (i.e. events of origin external to the plant) that have been identified in the site evaluation process or subsequent hazard assessments."	Revision to provide clarification.			Correct but that is also true for any other safety aspects
Ukraine **8**	5.17 The design shall include due consideration of all feasible~~those~~ natural and human induced external events (i.e. events of origin external to the plant) that have been identified in the site evaluation process. Natural external events shall be addressed. Human induced external events arising from nearby industries and transport routes shall be addressed. Causality and likelihood shall be considered in postulating potential concurrent hazards. In the short term (less than 72 hours), the safety of the plant shall not be permitted to be dependent on the availability of off-site services such as electricity supply and fire fighting services. The design shall take due account of site specific conditions and nuclear installation/s features to determine the maximum delay time by which off-site services need to be available.	Editorial Clarification what is short term Added "nuclear installation features", because max delay time depends from both site specific and installation design features			Definition of hazards to be considered for design is not in the scope of SSR2/1.
Canada **11**	5.17 to 5.22 Move 5.17, 5.19, 5.20, and 5.22 after 5.15a.	Nearly all the text related to external hazards also applies to internal hazards (in particular internal fire). Only 5.21 is unique to external hazards as they are much harder to bound and therefore the search for margin to a cliff-edge is appropriate.		Agreed, see new distribution	

France 4	5.17 fourth sentence ~~Causality~~ Relation and likelihood shall be considered in postulating potential concurrent hazards. In the short term, the safety of the plant shall not be permitted to be dependent on the availability of off-site services such as electricity supply and fire fighting services.	Causality may be too strong.			"Causality" seems correct
		No initial IAEA proposal			
Pakistan **7**	5.17a New addition The provisions for withstanding and recovering from loss of offsite power shall be designed and qualified to withstand potential initiating events (PIEs) of very low probability (internal and external) and any event that may occur as a consequence to the PIEs.	The damage to the offsite power infrastructure from the earthquake and tsunami resulted in the failure to restore any AC electrical power may be for many days. During this lingering loss of offsite power condition, no AC power may be available to operate equipment. This resulted in having no onsite capability to provide water inventory to reactor core and cooling to the spent fuel pools. It is therefore, suggested that the provisions for withstanding and recovering from loss of offsite power must be designed and qualified to withstand potential initiating events (PIEs) of very low probability (internal and external such as earthquake, tsunami, etc.) and any event that may occur as a consequence to the PIEs.			The concern seems to be addressed in 5.17 which outlines that off-site supports cannot be credited in the short term following the onset of the accident
		No initial IAEA proposal			
Canada **12**	5.19 Change to "Features shall be provided to minimize any interactions between buildings containing items important to safety (including power cabling and control cabling) and any other plant structure as a result of external events considered in the design or in subsequent hazards analysis."	Revision to provide clarification as per comment #10 above.			Reassessments are not explicitly addressed in SSR-2/1 because out of scope of design.
19.1	5.20 The design shall be such as to ensure that items important to safety are capable of withstanding the effects of external events considered in the design, and if not, other features such as passive barriers shall be provided to protect the plant and to ensure that the required safety function will be performed.	5.20 The design shall be such ~~as to ensure~~ that items that are necessary to fulfil the fundamental safety functions ~~important to safety~~ are either capable of withstanding the effects of external events considered in the design or protected from such effects by~~, and if not,~~ other features such as passive barriers ~~shall be provided to protect the plant and to ensure that the required safety function will be performed~~.	See new 5.15 a 5.20 can be deleted		

France 4bis	5.20 The design shall be such ~~as to ensure~~ that items that are necessary to fulfil the fundamental safety functions ~~important to safety~~ are either capable of withstanding the effects of external events considered in the design or protected from such effects by~~, and if not,~~ other features such as **physical** ~~**passive**~~ barriers ~~shall be provided to protect the plant and to ensure that the required safety function will be performed~~.	Not only passive barriers may be acceptable. A door that clauses automatically might be acceptable	Accepted		
ENISS 6 **WNA 6**	5.20 The design shall be such ~~as to ensure~~ that items that are necessary to fulfil the fundamental safety functions are either capable of withstanding the effects of external events considered in the design or protected from such effects by~~,~~ other features such as physical ~~passive~~ barriers	Not only passive barriers may be acceptable. A door that clauses automatically or manually might be acceptable.	Accepted		
19.1	5.21. The seismic design of the plant shall provide for a sufficient safety margin to protect against seismic events and to avoid cliff edge effects (see footnote 5). 5.73. The safety analysis shall provide assurance that uncertainties have been given adequate consideration in the design of the plant.	5.21 The design of items important to safety shall provide for adequate provisions or margins to avoid cliff edge effects to accommodate external hazards of a severity or duration moderately exceeding that derived from the site evaluation. For items ultimately necessary to prevent significant radiological releases, this requirement shall be fulfilled with significant margins.	5.21 The design of the plant~~items important to safety~~ shall provide for adequate margin to protect items important to safety against external hazards and~~provisions or margins~~ to avoid cliff edge effects ~~to accommodate external hazards of a severity or duration moderately exceeding that derived from the site evaluation. For items ultimately necessary to prevent significant radiological releases, this requirement shall be fulfilled with significant margins~~. 5.21 a The design of items ultimately necessary to prevent large or early ~~significant radiological~~ releases~~, this requirement shall be fulfilled with significant margins~~ shall be highly conservative, so that margins are available to withstand natural hazards exceeding those derived from the site evaluation. SAFETY ANALYSIS 5.73. The safety analysis shall provide assurance that uncertainties have been given adequate consideration in the design of the plant and that adequate margins are available.		
USA 1 (NRR)	5.21 last sentence For items ultimately necessary to prevent significant radiological releases, this requirement shall be fulfilled with ~~significant~~ adequate (or sufficient) margins.	The words "significant" and "moderate" used in this context are not well understood. It seems better to provide a set of criteria from which adequate margin can be constructed.		See new 5.21 and 5.73	

USA 1 Case (RES)	5.21 Change 5.21 to read: The design of items important to safety shall provide ~~for~~ adequate ~~provisions of~~ margins to account for: (1) the uncertainty of the historical information (e.g., severity or duration) used in choosing parameters derived from the site evaluation, (2) The potential for cliff edge effects, (3) an appropriate combination of effects of normal and accident conditions, and the importance of the safety function being performed in both design basis and design extension conditions.			See new 5.21 and 5.73	
USA 3 (Johnson)	Change "…avoid cliff edge effects to accommodate external hazards …derived from the site evaluation," to "…avoid cliff edge effects to accommodate internal or external hazards …derived from the safety analysis or site evaluation."	It is not clear that cliff edge effects are limited to external hazards. Include a similar idea in 5.16.		See new 5.21 and 5.73	
Belgium **5**	5.21 The design of ~~items~~ provisions important to safety shall provide for adequate ~~provisions or~~ margins to avoid cliff edge effects to accommodate external hazards of a severity or duration ~~moderately~~ exceeding that derived from the site evaluation. ~~For items ultimately necessary to prevent significant radiological releases, this requirement shall be fulfilled with significant margins.~~	More general formulation. The need for moderate or significant margin depends on the hazard, provisions, … In all cases, the margins need to be adequate		See new 5.21 and 5.73	
Finland **SSR-2/1** **3**	5.21 The design of items important to safety shall provide for adequate provisions or margins to avoid cliff edge effects to accommodate external hazards of a severity or duration ~~moderately~~ exceeding that derived from the site evaluation. For items ultimately necessary to prevent significant radiological releases, this requirement shall be fulfilled with significant margins.	delete moderately, see the safety assessment requirements GSR Part 4 req. 4.31 and 4.48a.		See new 5.21 and 5.73	
Germany **SSR-2/1** **17**	5.21. The design of items important to safety shall provide for ~~adequate~~ provisions ~~or margins~~ to avoid cliff edge effects to accommodate external hazards of a severity or duration moderately exceeding that derived from the site evaluation. ~~For items ultimately necessary to prevent significant radiological releases, this requirement shall be fulfilled with significant~~	It is not possible to define which amount of margins is "adequate" or "significant". Therefore, the text referring to these unspecified (and unspecifiable) terms should be deleted.		See new 5.21 and 5.73	

	~~margins.~~				
Hungary **5**	5.21. The seismic design of the plant shall provide for a sufficient safety margin to protect against seismic events and to avoid cliff edge effects (see footnote 5).	The original paragraph is more appropriate. Concerning passage *„…to accommodate external hazards of a severity or duration moderately exceeding that derived from the site evaluation."*: Definitions correspond to the definitions list or at most to the footnotes, but not to the body text. Concerning passage *„…For items ultimately necessary to prevent significant radiological releases, this requirement shall be fulfilled with significant margins."*: It is not clear why these items are to be highlighted in this context. Moreover, it is not clear what the term „*significant*" is meant to mean.		See new 5.21 and 5.73	
Canada **13**	5.21 Change to "The design of items important to safety shall provide for adequate provisions or margins to avoid cliff edge effects to accommodate ~~external hazards of a severity or duration moderately exceeding that derived from the site evaluation~~ low probability, high consequence external hazards which moderately exceed that specified in the design. ~~For items ultimately necessary to prevent significant radiological releases, this requirement shall be fulfilled with significant margins.~~"	The first sentence should be clarified as indicated. First sentence refers to an increase in the magnitude of the hazard. The second sentence implies that there must be additional design margins remaining even for the increased hazard. As currently stated, this paragraph requires double margins to cliff edges. This has not been demonstrated to be necessary. Second sentence must be deleted.		See new 5.21 and 5.73	
UK 9	5.21 For items ultimately necessary to prevent significant radiological releases, this requirement shall be fulfilled with ~~significant~~ appropriate margins.	"Significant" is an imprecise term and could lead to a disproportionate cost being incurred for little safety benefit.		See new 5.21 and 5.73	
France 5	5.21 The design of items important to safety shall provide for adequate provisions or margins ~~to avoid cliff edge effects~~ to accommodate external hazards of a severity or duration moderately exceeding that derived from the site evaluation. As a defence in depth provision, for items ultimately necessary to prevent a severe accident and significant radiological releases, this requirement shall be fulfilled with	Superfluous (redundant with margins to accommodate hazards more severe)		See new 5.21 and 5.73	

	significant margins				
ENISS 7 **WNA 7**	5.21 The design of items important to safety shall provide for adequate provisions or margins ~~to avoid cliff edge effects~~ to accommodate external hazards of a severity or duration moderately exceeding that derived from the site evaluation. As a defence in depth provision and according to a graded approach, for items ultimately necessary to prevent and mitigate severe accidents and to avoid early or large ~~significant~~ radiological releases and long term off site contaminsation, this requirement shall be fulfilled with ~~significant~~ adequate margins.	ENISS: See 2.13 (4) WNA: For completion and clarification. Avoidance of long term contamination should not be forgotten either.		See new 5.21 and 5.73	
	Requirement 19: Design basis accidents **A set of accident conditions that are to be considered in the design shall be derived from postulated initiating events for the purpose of establishing the boundary conditions for the nuclear power plant to withstand, without acceptable limits for radiation protection being exceeded.**	No initial IAEA proposal	**Requirement 19: Design basis accidents** **A set of accidents ~~conditions~~ that are to be considered in the design shall be derived from postulated initiating events for the purpose of establishing the boundary conditions for the nuclear power plant to withstand, without acceptable limits for radiation protection being exceeded.**		
Germany **SSR-2/1** **18**	**Requirement 19: Design basis accidents** **A set of ~~accident~~ boundary conditions that are to be considered in the design shall be derived from postulated initiating events for the purpose of establishing the boundary conditions for the nuclear power plant to withstand, without acceptable limits for radiation protection being exceeded.**	The term "accident conditions" now include severe accidents as well. This is probably not meant here according to the following paragraphs. The definition should be corrected – "boundary conditions" are proposed to be used.		**It is proposed to delete the word "conditions" on the first line.**	
		No initial IAEA proposal			
Germany **SSR-2/1** **19**	**Requirement 20: Design extension conditions** **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. These design extension conditions shall be used to identify the additional accident scenarios to be addressed in**	If the new terminology "design extension conditions" should be further used, it must be clearly stated and distinguished that design extension conditions are not the same for current and next generation NPPs. A link to accident management provisions for existing plants was added.			**DECs are considered for designing specific safety features (safety features for DECs)**

	the design or by accident management provisions and to plan practicable provisions for the prevention of such accidents or mitigation of their consequences if they do occur.				
		No initial IAEA proposal			
Germany **SSR-2/1** **20**	5.27. An analysis of design extension conditions for the plant shall be performed[10]. The main technical objective of considering the design extension conditions is to provide assurance that the design of the plant or the additional measures implemented in accident management programmes are such as to prevent accident conditions not considered design basis accident conditions, or to mitigate their consequences, as far as is reasonably practicable. This might require additional safety features to cope with design extension conditions, or extension of the capability of safety systems to maintain the integrity of the containment and other building structures used to confine radioactive materials. These additional safety features for design extension conditions, or this extension of the capability of safety systems, shall be such as to ensure the capability for managing accident conditions in which there is a significant amount of radioactive material in the containment or any other building of the plant (including radioactive material resulting from severe degradation of the reactor core or the fuel in the spent fuel pool). The plant shall be designed or accident management provisions shall be such that it can be brought into a controlled state and the ~~containment~~ confinement functions can be maintained, with the result that significant radioactive releases would be practically eliminated (see 2.8 (c)). The effectiveness of provisions to ensure the functionality of the containment and other confinement structures foreseen could be analysed on the basis of the best estimate approach.	This definition was primarily made for core melt accidents. Additions are proposed to include severe accidents initiated in all operational states and to include accident management provisions of current plants. Loads to the confinement structure from severe accidents in spent fuel pools have not been treated so far by the text. Such are covered now by the proposed modification of the text.			**SSR-2/1 requirements are established irrespectively of the age of the NPP.** **Extension to other building containing significant amount of radioactive materials needs attention.** **To be considered in the next full revision**
	5.27 …This might require additional safety features for design extension conditions, or extension of the capability of safety systems to maintain the integrity of the containment.	No initial IAEA proposal	5.27 …This might require additional safety features for design extension conditions, or extension of the capability of safety systems to prevent or mitigate a severe accident, or to maintain the integrity of the containment.		

Canada **14**	5.27 third sentence "This might require additional safety features for design extension conditions, or extension of the capability of safety systems to prevent or mitigate a severe accident, or to maintain the integrity of the containment."	Preventing a severe accident, if it is possible, is better than just protecting containment integrity after core melt. This is acknowledges in the second sentence of this paragraph but omitted from the third.	**Accepted for internal consistency**		
		No initial IAEA proposal			
Canada **15**	5.28 line 1 Remove "design basis" and change as below, or to "safety requirements" "The design extension conditions shall be used ~~to define the design basis for~~ in the design of safety features and for the design..."	The term "design basis" has a particular meaning restricted to conservative design rules applied for protection from DBAs. It is used extensively in established international codes and standards. To avoid confusion, the term should never be used beyond the design basis. Canada cannot support the use of "design basis" in this way. The definition for design basis from the IAEA glossary is '*The range of conditions and events taken explicitly into account in the design of a facility, according to established criteria, such that the facility can withstand them without exceeding authorized limits by the planned operation of safety systems*.' We should note that a DEC state corresponds to a state where the authorized limits have likely been exceeded, and so it would not be consistent to use the term "design basis" given that it pertains to the facility's capability to stay within the authorized limits.		**'design basis" replaced by "design specifications"** **NUSSC-WG** **See box right below**	
22.1	**Requirement 20 Design extension conditions** 5.29. The analysis undertaken shall include identification of the features that are designed for use in, or that are capable of preventing or mitigating, events considered in the design extension conditions. These features: (a) (b) Shall be capable of performing in the environmental conditions pertaining to these design extension conditions, including design extension conditions in severe accidents, where appropriate; (c)	**Requirement 20 Design extension conditions** 5.29. The analysis undertaken shall include identification of the features that are designed for use in, or that are capable of preventing or mitigating, events considered in the design extension conditions. These features: (a) (b) (c) **(d)** Shall include sufficient design margins to remain operational in conditions moderately more severe than those considered in their design basis to avoid cliff edge effects to occur	**Requirement 20 Design extension conditions** 5.29. The analysis undertaken shall include identification of the features that are designed for use in, or that are capable of preventing or mitigating, events considered in the design extension conditions. These features: (a) (b) (c) ~~(d) Shall include sufficient design margins to remain operational in conditions moderately more severe than those considered in their design basis to avoid cliff edge effects to occur~~ See 5.73 modified (above) In 5.28 Replace "design basis" by "design specifications"		

		No initial IAEA proposal			
Canada **16**	5.29 (b) (b) Shall be shown, with reasonably high confidence to be capable of performing in the environmental conditions pertaining to these design extension conditions, including design extension conditions in severe accidents, where appropriate	This appears to call for full environmental qualification of equipment for DECs. EQ delivers high confidence for DBAs and is not intended for DECs. Full EQ for DECs is not practicable and is inconsistent with the “best estimate” and “as far as is reasonably practicable” approach described in paragraph 5.27.			**Safety features for DEC shall be qualified for conditions they have to mitigate**
		No initial IAEA proposal			
France 6	5.29 (a) Shall be independent, to the extent practicable, of those used in more frequent accidents. <u>Moreover, similar independency shall be sought between features capable of preventing events considered in the design extension conditions and those capable of mitigating them.</u>	According to Fukushima reactors accident insights, severe accident could occur due to multiple failures. If a severe accident occur, it means provisions to prevent it failed thus mitigating provisions should be independent, to the best extent; from preventive provisions.			**See new proposal for Req. 7, item 4.13a as reworded by NUSSC-WG**
Belgium **6**	**Requirement 20 Design extension conditions** 5.29. The analysis undertaken shall include identification of the features that are designed for use in, or that are capable of preventing or mitigating, events considered in the design extension conditions. These features: (a) (b) (c) ~~(d) Shall include sufficient design margins to remain operational in conditions moderately more severe than those considered in their design basis to avoid cliff edge effects to occur~~	Features designed for use in design extension conditions (DEC) should have an adequate design basis to be able to withstand the identified DEC they are designed for. This results in margins to cliff edge effects sufficiently beyond the basic design of the plant. Is it practicable to consider cliff edge effects beyond the design extension conditions taken into account ?			**D) is deleted, see 5.73**
USA 3 Case (RES)	5.29 Second sentence: “These <u>equipment survivability</u> features:”	This would improve document clarity by adding a descriptive term (equipment survivability) that can be used that is distinguishable from the DBA concept of equipment qualification.			**Safety features are expected to be qualified according to the design extension conditions**

					with rules less conservative
USA 4 Case (RES)	5.29 d Break 5.29 (d) into two separate items: (d) Shall include sufficient design margin to avoid cliff edge effects. (e) Shall minimize, to the extent practical, the potential for common cause failure from the hazards affecting design basis equipment.	Improve clarity of item (d) by avoiding the use of qualitative terms such as "moderately more severe," replacing them with criteria for consideration.		**d) Is deleted** **See new requirements for the independence of SSCs**	
Finland **SSR-2/1** **4**	5.29 (d) Shall include sufficient design margins to take into account possible uncertainties in he expected environmental considerations~~remain operational in conditions moderately more severe than those considered in their design basis~~ to avoid cliff edge effects to occur	clarity		**d) Is deleted**	
Canada	5.29 (d) Shall include sufficient design margins to remain operational in conditions moderately more severe than those considered in ~~their~~ design basis accidents to avoid cliff edge effects ~~to occur~~.	The reasoning is circular. As worded, equipment must be designed to remain operational in conditions more severe than those for which it was designed. So it must be designed for these more severe conditions. But now, it must be designed for a margin beyond these new conditions. And so on… The text should certainly not say "their design basis". See comment **Error! Reference source not found.**.		**d) Is deleted**	
Germany **SSR-2/1** **22**	5.29 (d) Shall ~~include sufficient design margins to~~ be designed in such a way that they remain operational in conditions moderately more severe than those considered in their design basis to avoid cliff edge effects to occur.	It is not possible to define which amount of margins is "sufficient". Therefore, the wording should be changed to avoid this undefined term.		**d) Is deleted**	
Ukraine **9**	5.29 (d) Phrase "conditions, moderately more severe than those considered in design" need to be clarified in relation to degree or criteria of such moderation	Without sufficient clarification this phrase can be interpreted in different ways		**d) Is deleted**	
UK 10	5.29 (d) Shall include sufficient design margins to remain operational in conditions in which they would be required to perform their safety function ~~moderately more severe than those considered in their design basis~~ to avoid cliff edge effects to occur	Moderately more severe than those considered in their design basis might not be the likely conditions that they are required to operate in within design extension condition.		**d) Is deleted**	

ENISS 8 **WNA 8**	5.29 (d) The analysis undertaken shall include identification of the features that are designed for use in, or that are capable[9] of preventing or mitigating, events considered in the design extension conditions. These features: … ~~(d) Shall include sufficient design margins to remain operational in conditions moderately more severe than those considered in their design basis to avoid cliff edge effects to occur.~~	ENISS: Margins for all DEC is excessive, as DEC is “beyond the design basis” but considered during the design phase. Clause 5.21, which applies to the design in general, is sufficient and does not need repetition here. WNA: Cliff edge-effects have to be considered by design margins of safety SSCs to maintain the safety function robust. In some cases cliff edge-effects should be considered as beyond design impact or load assumption that has to be covered by DEC’s. But it is too excessive to require as well additional margins for all DECs. In the probabilistic logic the frequency of occurrence of such cliff edge-effects is extremely low so that it should be practical eliminated. Clause 5.21, which applies to the design in general, is sufficient and does not need repetition here. Btw, delete the phrase “...to occur.” From the last line of item (d). It is not necessary to understanding the requirement.		**d) Is deleted**	
		No initial IAEA proposal			
Germany **SSR-2/1** **21**	(e) Shall not interact with the plant’s safety or other actions on lower levels of defence, if specially designed to cope only with severe accidents.	A new requirement is proposed that permits interactions of systems installed and used for severe accidents with other safety systems used for design basis accidents. This is a common requirement in existing NPPs and as well for next generation.			**See new proposal for Req. 7, item 4.13a as reworded by NUSSC-WG**
		No initial IAEA proposal			
Pakistan **6**	5.30 a New addition Adequate consideration shall be given to the control of fission products, hydrogen and other substances that may be generated or released within the containment in accident conditions. A reliable filtered venting system shall be designed to be independent of AC power and to operate with limited operator actions from the control room.	In accident conditions hydrogen and other substances that may be generated or released within the containment must be kept in containment by controlling containment pressure without venting (i.e., through heat removal from the containment when possible) or by venting to a safe location. Accordingly, PNRA is of the view that the design, of new NPPs and wherever possible for older plants, should have provisions for containment venting through filters so as to maintain the containment capability by depressurization in accident conditions as well as reducing the release of radioactivity to the environment.			**Addressed in 6.29 and 6.28b**

		No initial IAEA proposal			
France 7	5.29 Add a new bullet : (e) include items ultimately necessary to prevent significant radiological releases. These item shall be designed with margin enabling them to accommodate external hazards of a severity or duration significantly exceeding that derived from the site evaluation	To make a clearer link with 5.21			**See new proposal for 5.21a as reworded by NUSSC-WG**
	Requirement 20 Design extension conditions 5.31. The design shall be such that design extension conditions that could lead to significant radioactive releases are practically eliminated (see footnote 1). If not,for design extension conditions that cannot be practically eliminated, only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public, and sufficient time shall be made available to implement these measures.	**Requirement 20 Design extension conditions** 5.31. The design shall be such that ~~design extension~~ conditions that could lead to significant radioactive releases are practically eliminated (see footnote 1). 5.31 a ~~If not, f~~For design extension conditions ~~that cannot be practically eliminated~~, only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public, and sufficient time shall be made available to implement these measures.	**Requirement 20 Design extension conditions** 5.31. The design shall be such that conditions that could lead to early or large ~~significant~~ radioactive release are practically eliminated (see footnote 1). 5.31 a For design extension conditions, only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public, and sufficient time shall be made available to implement these measures.		
Germany **SSR-2/1** **23**	Remove 5.31 and replace 5.31 a by For design extension conditions without severe fuel damage in the core or in the spent fuel storage radiological releases shall be kept within acceptable limits. For design extension conditions including severe fuel damage in the core or in the spent fuel storage only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public, and sufficient time shall be made available to implement these measures.	The remaining text in both paragraphs should be deleted as it is already defined under 2.8(c). Also, due to a separation into two paragraphs the content gets lost. Change “core melt” against “severe fuel damage in the core or in the spent fuel storage” - to take accidents in fuel storage into account			See req. 6.68
Russia 12	5.31 The design shall be such that conditions that could lead to significant radioactive releases are decreased to the lowest achievable level~~practically eliminated~~	Proposal has the aim to avoid usage of uncertain term “practical elimination”			“Practical elimination” is preferred (new concept)

ENISS 9	5.31 The design shall be such that conditions that could lead to ~~significant~~ early or large radioactive releases and long term off site contamination are practically eliminated (see footnote ~~1~~2 &-3).	See. 2.13 (4) Ensure consistency of numbering of footnotes with text.			**Included in "early or large release"**
WNA 9	5.31 The design shall be extended in such a way that ~~design extension~~ design extension conditions that could lead to ~~significant~~ early or large radioactive releases and long term off site contamination are practically eliminated (see footnote ~~1~~2 &-3).	For clarification to ensure that provisions against DEC are considered additionally and in a graded approach during the design phase. Include the term "design extension" The term "design extension" qualifies the requirement. Otherwise the requirement addresses all conditions and should not be under requirements for design extension conditions but under general requirements.			
25.2	**Requirement 32 Design for optimal operator performance** 5.55 The design shall support operating personnel in the fulfilment of their responsibilities……., to facilitate interaction between the operating personnel and the plant.	**Requirement 32 Design for optimal operator performance** 5.55 The design shall support operating personnel in the fulfilment of their responsibilities……., to facilitate interaction between the operating personnel and the plant in operational states and accident conditions.	**Requirement 32 Design for optimal operator performance** 5.55 The design shall support operating personnel in the fulfilment of their responsibilities……., to facilitate interaction between the operating personnel and the plant in operational states and accident conditions.		
Germany **SSR-2/1** **24**	5.55. The design shall support operating personnel in the fulfilment of their responsibilities and in the performance of their tasks, and shall limit the effects of operating errors on safety. The design process shall pay attention to plant layout and equipment layout, and to procedures, including procedures for maintenance and inspection, to facilitate interaction between the operating personnel and the plant in all operational states and under accident conditions.	All operational states are meant.			**"all" is not necessary**
25.1	**Requirement 33: Sharing of safety systems between multiple units of a nuclear power plant** **Safety systems shall not be shared between multiple units unless this contributes to enhanced safety.** 5.63. Safety system support features and safety related items shall be permitted to be shared between several units of a nuclear power plant if this contributes to safety. Such sharing shall not be permitted if it would increase either the likelihood or the consequences of an accident at any unit of the plant.	**Requirement 33: Sharing of safety systems between multiple units of a nuclear power plant** ~~**Safety systems shall not be shared between multiple units unless, in accident conditions, this contributes to enhanced safety for the units.**~~ **Each unit shall have its own systems important to safety to control and mitigate the anticipated operational occurrences and accidents considered for the design.** 5.63 In accident conditions, inter connecting support systems among the units is allowed if it can be justified that it facilitates the accident management of one unit by giving the possibility to restore a safety function. ~~Safety system support features and safety related items shall be permitted to be shared between several units of a nuclear power plant if this contributes to safety.~~ Such a sharing shall not be permitted if it would increase either the likelihood or the consequences of an accident at any unit of the plant.	**Requirement 33: S~~haring of s~~afety features for design extension conditions and safety systems of~~between~~ multiple units of a nuclear power plant** **Each Unit shall have its own systems and its own safety features for deisgn extension conditions~~important to safety to control and mitigate the anticipated operational occurrences and accidents considered for the design~~.** 5.63 To increase defence in depth, reasonable possibilities of interconnection between units shall be considered. ~~In accident conditions, inter connecting support systems among the units is allowed if it can be justified that it facilitates the accident management of one unit by giving the possibility to restore a safety function. Such a sharing shall not be permitted if it would increase either the likelihood or the consequences of an accident at any unit of the plant.~~		

Canada **18**	**Requirement 33:** The original text should be restored. "Safety systems shall not be shared between multiple units unless this contributes to enhanced safety" Alternatively, add a further sentence "Certain existing operating reactor designs have shared systems important to safety. This is acceptable if it can be demonstrated that these units continue to meet their safety goals."	The proposed new text precludes sharing of systems important to safety even if it can be demonstrated that the sharing enhances safety. It should be recognized that some reactor designs share common safety systems – for example, a common high pressure emergency coolant injection system supply tank for several units on a site. It is important to recognize that these units still can be operated safely and meet their safety goals.		**See new proposal**	
Pakistan **2**	**Requirement 33:** Requirement 33 may be restored to original statement as **Safety systems shall not be shared between multiple units unless, in accident conditions, this contributes to enhanced safety ~~for the units~~.**	Since the statement is used in broader way.		**See new proposal**	
Germany **SSR-2/1** **25**	**Requirement 33:** **Each unit shall have its own systems important to safety to control ~~and mitigate the~~ anticipated operational occurrences and accidents considered for the design <u>of the plant and to mitigate the consequences of such events</u>.**	Consistency with the terminology used elsewhere in the document. The (radiological) consequences of an accident are to be mitigated, not the accident itself.		**See new proposal**	
Hungary **6**	**Requirement 33:** **Each unit shall have its own <u>safety</u> systems ~~important to safety to control and mitigate the anticipated operational occurrences and accidents considered for the design~~. <u>Safety systems shall not be shared between multiple units unless this contributes to enhanced safety.</u>**	The new text does not consider the exception declared in the original requirement in connection with the contribution of common safety systems to enhanced safety. In addition, the added explanation int he new text is not necessary.		**See new proposal**	
Japan **1.1**	**Requirement 33:** Modify as following two options. **(1)Each unit shall have its own systems important to safety to ~~control~~ <u>prevent</u> and mitigate the anticipated operational occurrences and <u>design basis</u> accidents ~~considered for the design~~.**	Better wording for "prevent" instead of "control" consisted with the definition of "Item important to safety" in IAEA glossary 2007. (1)Clarification for plant states in this overarching requirement. It is understanding that it includes the anticipated operational occurrences and design basis accidents, not DEC. (2)Otherwise if this overarching requirement includes DEC, it should clarify the		**See new proposal**	

	or **(2)Each unit shall have its own systems important to safety to ~~control~~ prevent and mitigate the anticipated operational occurrences and accident~~s~~ conditions unless a sharing of system important to safety increases neither the likelihood nor the consequences of an accident ~~considered for the design~~.**	following condition as the same as stated in the last sentence in para. 5.63.			
Ukraine **10**	**Requirement 33 last sentence** **Such a sharing should not result in increase of probability of occurrence or deterioration of the accident consequences at any plant unit**			**See new proposal**	
ENISS 10	**Requirement 33** **Sharing of safety systems between multiple units of a nuclear power plant** **Each unit shall have its own safety systems ~~important to safety~~ to control and mitigate the anticipated operational occurrences and accidents considered for the design.** **Some specific features may be common to the site (e.g. communication systems (rqt 37) and technical support center (rqt 67)**	Consistency of text with the title Some features are site installations		**See new proposal**	
USA 5 (Johnson)	5.63 Change “systems important to safety” to “safety systems.”	As currently written the requirement is inconsistent with the text of Reqt. 33.		**See new proposal**	
Finland **SSR-2/1** **5**	5.63 In accident conditions, inter connecting support systems among the units is allowed if it can be justified that it facilitates the accident management of one unit by giving the possibility to restore a safety function. Such a sharing shall not be permitted if it would increase either the likelihood or the consequences of an accident at any unit of the plant.	The original text was better. Please clarify.		**See new proposal**	
Germany **SSR-2/1**	5.63. In design extension ~~accident~~ conditions, ~~inter connecting~~ interconnecting support systems among the units ~~is~~ are allowed if it can be justified that ~~it~~ they facilitate~~s~~ the accident management of one unit by giving the possibility to restore a	The original wording of “accident conditions” also implies the design basis accidents (DBA) which have to be controlled by the safety systems at the level of defence 3. These, of course, do not have to be shared between the different units. In individual cases, it may certainly be helpful for Design Extension Conditions		**See new proposal**	

26	safety function. Such a sharing shall not be permitted if it would increase either the likelihood or the consequences of an accident at any unit of the plant.	(DECs) if the neighbouring unit could use the installations for controlling DECs, at least temporarily. Here, we have in mind the experience made in Units 5 and 6 of the Fukushima Daiichi site that shared the remaining diesel engine. This would actually not contravene the philosophy of the Accident Management Concept.			
Japan **1-2**	5.63 In accident conditions, shared inter connecting support systems among the units ~~is~~ are allowed if ~~it~~ they can be justified that ~~it~~ they facilitate~~s~~ the accident management of one unit by giving the possibility to restore a safety function. Such a sharing shall not be permitted if it would increase either the likelihood or the consequences of an accident at any unit of the plant.	(1)Better wording for inserted as "shared". (2)Editorial.		**See new proposal**	
UK 13	5.63 In accident conditions, inter connecting support systems among the units ~~is allowed~~ shall be considered if it can be justified that it facilitates the accident management of one unit by giving the possibility to restore a safety function. Such a sharing shall not be permitted if it would increase either the likelihood or the consequences of an accident at any unit of the plant.	"Is allowed" should be replaced with "shall be considered" as we should expect licensees to consider interconnection of units to provide a positive safety benefit.		**See new proposal**	
France 9	5.63 In accident conditions, inter connecting support systems among the units ~~is allowed~~ may ~~if it can~~ be justified ~~that~~ if it facilitates the accident management of one unit by giving the possibility to restore a safety function. Such a sharing shall not be permitted if it would increase either the likelihood or the consequences of an accident at any unit of the plant.	Simplification		**See new proposal**	
		No initial IAEA proposal			
Germany **SSR-2/1** **27**	5.~~27~~75. The deterministic safety analysis shall mainly provide: … (f)Demonstration that the management of design extension conditions is possible by the automatic or manual actuation of ~~safety~~ implemented systems or other accident management provisions including mobile equipment and the use of ~~safety~~ such features in combination with ~~expected~~ planned actions by the operating personnel.	A modification of the text according to the current practice including the modifications after the Fukushima accident related to the use of mobile equipment seems to be necessary and is proposed. To talk about safety systems seems to be not appropriate in cases where the plant's safety is lost due to core melting.			Mobile equipment is not expected to be used for DECs

29.1	**Requirement 53: Heat transfer to an ultimate heat sink** **Systems shall be provided to transfer residual heat from items important to safety at the nuclear power plant to an ultimate heat sink. This function shall be carried out with very high levels of reliability for all plant states.**	**Requirement 53: Heat transfer to an ultimate heat sink** **Systems shall be provided to transfer residual heat from items important to safety at the nuclear power plant to an ultimate heat sink. This function shall be carried out with very high levels of reliability for all plant states.** 6.19a (after Requirement 53) If a high level of reliability of the residual heat transfer to the ultimate heat sink cannot be demonstrated for all potential conditions generated by external hazards, alternative means-shall be provided. These means, including the use of a different heat sink and the necessary associated features, shall be located and designed so that external hazards cannot result in the loss of the residual heat removal function.	**Requirement 53: Heat transfer to an ultimate heat sink** **~~Systems shall be provided to transfer residual heat from items important to safety at the nuclear power plant to an ultimate heat sink.~~ ~~This function~~The heat transfer to an ultimate heat sink shall be carried out with very high levels of reliability~~.~~ in anticipated operational occurrences and accident conditions. ~~for all plant states.~~** 6.19a (after Requirement 53) 6.19a The design of structures, systems and components ultimately necessary to transfer residual heat to an ultimate heat sink shall be -highly conservative, so that margins are available to withstand natural hazards exceeding those derived from the site evaluation. ~~If a high level of reliability of the residual heat transfer to the ultimate heat sink cannot be demonstrated for all potential conditions generated by external hazards, alternative means shall be provided.~~ ~~These means, including the use of a different heat sink and the necessary associated features, shall be located and designed so that external hazards cannot result in the loss of the residual heat removal function.~~		
Canada **19**	**Requirement 53** "This function shall be carried out with very high levels of reliability ~~for all plant states~~." If this change is accepted, change "high level of reliability" with "appropriate level of reliability" in 6.19a.	The same level of reliability cannot be delivered in all plant states. Overall, the reliability of heat transfer to the UHS must be very high, but progressive failures at levels 2, 3 and even 4 defence in depth will leave less redundancy and lower reliability. The appropriate level of confidence depends on the plant state. Design provisions are made for events inside the design basis with high confidence and in the design extension with reasonable confidence. See clause 5.27.		See new proposal made by NUSSC-WG	
Hungary **7**	**Requirement 53** **Systems shall be provided to transfer residual heat from items important to safety at the nuclear power plant the reactor to an ultimate heat sink. This function shall be carried out with very high levels of reliability for all plant states.**	Residual heat is to be transferred from where it is generated: from the reactor.		See new proposal made by NUSSC-WG	

France 10	**Requirement 53 Heat transfer to an ultimate heat sink** **Systems shall be provided to transfer residual heat from items important to safety at the nuclear power plant to an ultimate heat sink. This function shall be carried out with very high levels of reliability for all plant states <u>and in all potential conditions generated by external hazards</u>.**	To make the overarching requirement more consistent with associated requirement 6.19a		See new proposal made by NUSSC-WG	
ENISS 11 **WNA 10**	**Requirement 33 and 6.19 (a)** **Systems shall be provided to transfer residual heat from items important to safety at the nuclear power plant to an ultimate heat sink. This function shall be carried out with very high levels of reliability for all plant states, even those generated by external hazards** ~~6.19a If a high level of reliability of the residual heat transfer to the ultimate heat sink cannot be demonstrated for all potential conditions generated by external hazards, alternative means shall be provided.~~ ~~These means, including the use of a different heat sink and the necessary associated features, shall be located and designed so that external hazards cannot result in the loss of the residual heat removal function.~~ *This comment is copied here below together with the proposal 6.19 (a)*	Simplification. The function must be ensured in case of external hazards and this can be achieved by alternative means, but this is already permitted by the current wording which allows the function to be fulfilled through several systems. The precision added helps, but is not strictly needed as the term plant states already encompasses all			
Finland **SSR-2/1** **6**	<u>6.19 a. There shall be sufficient independent and diverse means including necessary power supplies available to remove the residual heat from the core and the spent fuel.</u>	Clarity		Seems to be included in the requirement	

USA 6 (Johnson)	6.19a If a very high level of reliability of the ~~residual~~ heat transfer from items important to safety to ~~the~~ an ultimate heat sink cannot be demonstrated for all ~~potential conditions generated by external hazards~~ accident conditions, including severe accidents and extreme external events, alternative means shall be provided. These means, including the use of a different heat sink and the necessary associated features, shall be located and designed consistent with Requirement 20. ~~so that external hazards cannot result in the loss of the residual heat removal function.~~	a) Requirement 53 does not deal directly with residual heat removal; it deals with removal of heat from components, e.g., RHR heat exchanger, diesel engines, pump rooms. b) It is not clear that external events are the only possible cause of loss of RHR. c) The equipment survivability requirements of the DEC Requirement 20 should not be unnecessarily repeated in different language.		See new text of requirements 53 and 6.19 a	
USA 7 (Johnson)	6.19a (Req 52) Insert wording similar to the new 6.19a – modified appropriately for RHR. *Delattre. What is the comment? Is it to introduce a similar paragraph under Req 52 ?*	Both RHR and component cooling are necessary.		See new text of requirements 53 and 6.19 a	
Canada **20**	6.19 a "If ~~a high~~ an appropriate level of reliability of the residual heat transfer to the ultimate heat sink cannot be demonstrated for ~~all potential conditions generated by external hazards~~ design extension conditions, alternative means shall be provided. These means, including the use of a different heat sink and the necessary associated features, shall be located and designed so that ~~external hazards~~ design extension conditions cannot result in the loss of the residual heat removal function."	The use of the words "all potential conditions" is open-ended. The scope must be limited to DECs. The wording in the proposed clause is restricted to external hazards and therefore does not apply to equally significant internal hazards or failures. It should apply to internal events and internal hazards too. DECs encompass all sources of events that are more severe than DBAs and that must be considered in design.		See new text of requirements 53 and 6.19 a	
Germany **SSR-2/1** **28**	6.19a ~~If a high level of reliability of the residual heat transfer to the ultimate heat sink cannot be demonstrated for all potential conditions generated by external hazards, alternative means shall be provided.~~In case of an unavailability of the ultimate heat sink, independent and diverse means shall be provided.	If only one ultimate heat sink exists, a high level of reliability means, that a failure of the ultimate heat sink has to be practically eliminated. As this is hardly to achieve, independent and diverse means for residual heat removal shall be required.		See new text of requirements 53 and 6.19 a	

	~~These means, including the use of a different heat sink and the necessary associated features, shall be located and designed so that external hazards cannot result in the loss of the residual heat removal function~~. At least one of these means shall be effective after events involving natural hazards in design extension conditions.				
Hungary **7**	6.19a If a high level of reliability of the residual heat transfer to the ultimate heat sink cannot be demonstrated for all potential conditions generated by external hazards, alternative means shall be provided until the ultimate heat sink function is restored. These means, including the use of a different heat sink and the necessary associated features, shall be located and designed so that external hazards cannot result in the loss of the residual heat removal function.	The mentioned alternative means are to provide a temporary, intermediate function only.		See new text of requirements 53 and 6.19 a	
Japan **2**	6.19a If a high ~~level of~~ reliability of the residual heat transfer to the ultimate heat sink cannot be demonstrated for all potential conditions generated by external hazards, alternative means-shall be provided.	Editorial		See new text of requirements 53 and 6.19 a	
Pakistan **3**	6.19a If ~~a high~~ suitable or appropriate level of reliability …	To make the first sentence more realistic if suitable or appropriate level of reliability is used.		See new text of requirements 53 and 6.19 a	
Pakistan **4**	6.19a "... shall be located and designed so that ~~external hazards cannot result in the loss of the~~ residual heat removal function may be maintained."	Second sentence may be changed for better understanding		See new text of requirements 53 and 6.19 a	
UK 14	6.19a If a high level of reliability of the residual heat transfer to the ultimate heat sink cannot be demonstrated for all potential conditions generated by ~~external~~ all hazards (including external hazards), alternative means-shall be provided. These means, including the use of a different heat sink and the necessary associated features, shall be located and designed so that ~~external~~ it is not vulnerable to the same hazard type and therefore a single hazard cannot result in	This logic should be expanded beyond external hazards to all hazard types including internal hazards.	Accepted	See new text of requirements 53 and 6.19 a	

	the loss of the residual heat removal function.				
France 11	6.19 a Alternative means shall be provided if this very ~~If a~~ high level of reliability ~~of the residual heat transfer to the ultimate heat sink~~ cannot be achieved with the primary heat sink and associated means. ~~demonstrated~~ for all potential conditions generated by external hazards, alternative means shall be provided. These means, including the use of an alternate ~~different~~ heat sink and the necessary associated features, shall be located and designed so that external hazards cannot result in the loss of the residual heat removal function.	The initial new 6.19a weakens requirement 53. The alternate wording keeps however the initial idea developed.		See new text of requirements 53 and 6.19 a	
ENISS 11 **WNA 10**	Requirement 53 and 6.19 (a) *Already copied above for Requirement 53* ~~6.19a If a high level of reliability of the residual heat transfer to the ultimate heat sink cannot be demonstrated for all potential conditions generated by external hazards, alternative means shall be provided.~~ ~~These means, including the use of a different heat sink and the necessary associated features, shall be located and designed so that external hazards cannot result in the loss of the residual heat removal function.~~			See new text of requirements 53 and 6.19 a	
		No initial IAEA proposal			
Germany **SSR-2/1** **29**	Requirement 55: Control of radioactive releases from the containment The design of the containment shall be such as to ensure that any release of radioactive material from the nuclear power plant to the environment is as low as reasonably achievable, is below the authorized limits on discharges in operational states and is below acceptable limits in accident conditions (see 2.8(c)).	Link to new radiological requirement should be made			To be considered in the next full revision

		No initial IAEA proposal			
Poland **4**	New paragraph after 6.21 6.21a. The plant and containment systems design shall be such as to minimize the likehood of occurrence of containment bypass accidents and to mitigate the radioactive releases in such accidents, where they to occur.	To address the category of containment bypass accidents (DBAs and DECs) that could have significant radiological consequences, even in conditions without fuel melt (see accidents specified in EUR sec. 2.1.4.3.4, plus fuel handling accidents when containment is open).			Specific Concern to be addressed in the Safety Guides NS-G-1.10 and NS-G- 2.5
21.2	**Requirement 58: Control of containment conditions** **Provision shall be made to control the pressure and temperature in the containment at a nuclear power plant and to control any build-up of fission products or other gaseous, liquid or solid substances that might be released inside the containment and that could affect the operation of systems important to safety.**	New paragraphs under Requirement 58 after 6.28 6.28 a The design shall include the necessary features to enable the use of non-permanent equipment to restore the containment cooling. The non-permanent equipment may be available at the site or not. 6.28.b The loss of the containment structural integrity shall be practically eliminated. This shall be achieved without significant radioactive releases.	New paragraphs under Requirement 58 after 6.28 6.28~~.~~a To strengthen defence in depth, ~~T~~ the design shall include the necessary features to enable the safe use of non-permanent equipment to restore the removal -of heat from the containment ~~cooling~~. *[Footnote XX] ~~The non-permanent equipment may be available at the site or not.~~ 6.28~~.~~b The loss of the containment structural integrity shall be practically eliminated. This shall be achieved without ~~significant~~ early or large radioactive release~~s~~. Footnote XX: The non-permanent equipment may not be necessarily required to be stored on site.		
Finland **SSR-2/1** **7**	6.28 a The design shall include the necessary features to enable the use of non-permanent equipment to restore the containment cooling. The non-permanent equipment may be available at the site or not.	This is not needed if a diverse heat removal is required. There is still a possibility of using non-permanent equipment, but is should not be explicitly required if adequate provisions can be provided with fixed systems.			A main lesson learned from Fukushima accident.
Germany **SSR-2/1** **30**	6.28 a. The ~~design~~ plant shall be prepared to include the necessary features to enable the use of non- permanent equipment to restore the containment cooling. ~~The non-permanent equipment may be available at the site or not.~~	Mobile equipment is typically not allowed for design basis accidents. What is meant? Would this be allowed or required for new generation NPPs? It is proposed to delete this requirement or to make it more precise. If it is not defined whether the equipment shall be on-site or not, the last sentence bears no meaning and can be deleted.		See new proposal	
Canada **21**	6.28 a Delete the whole paragraph	The underlying objective to protect containment integrity is already explicit in 6.28 and 6.28b. As written, this clause introduces new specific requirements on how the objective is to be met. Many utilities will find the specific requirement impossible to meet.			A main lesson learned from Fukushima accident.

Pakistan **5**	6.28a Delete	It is covered by 6.28b			A main lesson learned from Fukushima accident.
UK 15	6.28a The design shall include the necessary features to enable the use of non-permanent equipment to restore the containment cooling. The non-permanent equipment will not necessarily be required to be stored on site. ~~may be available at the site or not.~~	"May be available at the site or not" is not the best way of expressing this requirement.	Accepted		
Ukraine **11**	6.28a The design shall include the necessary features to enable the use of non-permanent equipment to restore the function of heat removal inside containment ~~cooling~~.	Widening of range of heat release sources (nuclear fuel, high-energy systems and equipment) for which the possibility of using of non-permanent equipment must be provided in cases of failures of routine heat removal systems		Accepted, see new text	
France 12	6.28 a The design shall include the necessary features to enable the use of non-permanent equipment (which may be available at the site or not) to restore the containment cooling. ~~The non-permanent equipment may be available at the site or not.~~	Simplification		See new proposal	
France 13	6.29 b	A footnote would be valuable to clarify how "structural integrity" is too be understood	A proposal for glossary will be considered		
USA5 Case (RES)	6.28 a & b Revise 6.28a to state: The design shall include… cooling consistent with Requirement 20. The non-permanent…" Delete 6.28b.	The DEC requirement (Reqt. 20) contains all the necessary considerations to properly select and design a feature for any particular design extension condition. Selectively reproducing only parts of the requirement (like the proposed 6.28b) only creates confusion and incomplete consideration.			Portable equipment are for accidents exceeding design extension conditions addressed in Reqt 20.
WNA 11	6.28 a & b 6.28 a If the containment heat removal function is not sufficiently reliable for all accident conditions, the ~~The~~ design shall include the necessary features to enable the use of non-permanent equipment to restore the containment ~~cooling~~ heat removal. ~~The~~ It has to be assured that the non-permanent equipment ~~may be~~ is available independent whether it is stored on ~~at~~ the site or not. ~~6.28b The loss of the containment structural integrity shall be practically eliminated. This shall be achieved without significant radioactive releases.~~ There shall be means to prevent a suddenly and catastrophic loss of structural integrity of the containment in all plant states. These	6.28 asks for sufficient reliability of containment heat removal. Only if this cannot be achieved, other e.g. mobile means are needed. Last sentence was modified otherwise it doesn't give added value. What is to be practically eliminated are large releases, and this is already required in 2.13. 6.28b should therefore require protection of the containment structure as reasonable practicable – additionally any means to achieve this, should not lead to large releases. As this is a high level requirement, it might as well be stated as Req. 58 (e.g. as Containment protection) – the current Req 58 is a lower requirement then the new 6.28			Lesson from Fukushima accident (reliability of system is always questionable)

	means shall not lead to early or large radioactive releases.				
ENISS 12	6.28 a ~~The design shall include the necessary features to enable the use of non- permanent equipment to restore the containment cooling. The non-permanent equipment may be available at the site or not.~~ If the containment heat removal function is not sufficiently reliable for all potential conditions, alternative means shall be provided.	Addendum should be consistent in structure and terminology. Use the term "alternative means" which has already been introduced. 4.28 asks for sufficient reliability of containment heat removal. Only if this cannot be achieved, other means are needed.			Lesson from Fukushima accident (reliability of system is always questionable)
ENISS 13	6.28 b ~~The loss of the containment structural integrity shall be practically eliminated. This shall be achieved without significant radioactive releases.~~ There shall be means to prevent the loss of structural integrity of the containment in all plant states. These means shall not lead to early or large radioactive releases.	What is to be practically eliminated is early or large releases, and this is already required in 2.13. 6.28b should therefore require protection of the containment structure – additionally any means to achieve this, should not lead to early or large releases. As this is a high level requirement, it might as well be stated as Req. 58 (e.g. as Containment protection) – the current Req 58 is a lower requirement that could be taken as new 6.28			Lesson from Fukushima accident (reliability of system is always questionable)
USA 2 (NRR)	6.28b The loss of containment ~~structural~~ integrity shall be practically eliminated.	The phrase "structural integrity" tends to be too narrow, which may preclude other type of integrity (e.g., containment air tightness). The integrity of structure (both structural and otherwise) is virtually ensured with the implementation of 6.27, 6.28 and 6.28a (and other related sections).			The intention is to limit to the structure integrity (air tightness is not an issue in such a situation)
Belgium 7	6.28.b The loss of the containment structural integrity shall be practically eliminated. ~~This shall be achieved without significant radioactive releases.~~	Actions such as venting to avoid an irreversible loss of containment should be allowed. However, such actions result in a non-negligible release.			Non negligible is expected to be less than large
Finland SSR-2/1 8	6.28.b The loss of the containment structural integrity shall be practically eliminated. This shall be achieved without significant radioactive releases.	Please clarify. If the requirement is put on the containment this is not possible. However, if the requirement is for the sequences that could lead to large releases the requirements for the structural integrity of the containment would be feasible.		Comment needs clarification	

Germany **SSR-2/1** **31**	6.28 b. The loss of containment structural integrity shall be practically eliminated. This shall be achieved without significant radioactive releases (see 2.8(c)).	Reference to the new release criteria should be made.			Implicit in the text
Russia 13	6.28 b first sequence The loss of the containment structural integrity shall be the lowest achievable level of the probability~~practically eliminated~~.	Proposal has the aim to avoid usage of uncertain term "practical elimination"			"Practical elimination" is preferred (new concept)
		No initial IAEA proposal			
Germany **SSR-2/1** **32**	6.29. Design features or accident management provisions to control fission products, hydrogen, oxygen and other substances that might be released into the containment shall be provided as necessary: (a)To reduce the amounts of fission products that could be released to the environment in accident conditions; (b)To control the concentrations of hydrogen, oxygen and other substances in the containment atmosphere in accident conditions so as to prevent deflagration or detonation loads that could challenge the integrity of the containment. (c)To prevent concrete erosion or any other attack of the containment by core melt, that challenges its integrity.	What about most current operating plants? They do not have such design features mentioned. They are typically part of accident management provisions / back-ups. Provisions against loads from Molten Core Concrete Interaction (MCCI) which could challenge the containment should be added.			**Good practices for existing plants will be addressed in NS-G- 1.10 not at the requirement level.** **MCCI covered implicitly in 5.30** **To be considered in the next full revision**
46.3	**Requirement 67: Emergency control centre** **An on-site emergency control centre, separate from both the plant control room and the supplementary control room, shall be provided from which an emergency response can be directed at the nuclear power plant.** 6.42. Information about important plant parameters and radiological conditions at the nuclear power plant and in its immediate surroundings shall be provided in the on-site emergency control centre. The on-site emergency control centre shall provide means of communication with the control room, the supplementary control room and other important locations at the plant, and with on-site and off-site emergency response organizations. Appropriate measures shall be taken to protect the occupants of the emergency control centre for a protracted time against hazards resulting	**Requirement 67: ~~Emergency control~~ Technical support centre** (Foot note) **An on-site technical support centre, separate from both the plant control room and the supplementary control room, shall be implemented~~provided~~ from which technical support can be provided to the operation staff during accident conditions~~an emergency response can be directed at the nuclear power plant~~.** Footnote: Other facilities for the management of emergencies such as the Emergency Centre are addressed in GSR Part 7: Emergency Preparedness and Response 6.42. Information about important plant parameters and radiological conditions at the nuclear power plant and in its immediate surroundings shall be provided in the on-site technical support centre~~emergency control centre~~. The on-site technical support centre ~~emergency control centre~~ shall provide means of communication with the control room, the supplementary control	**~~Requirement 67: Technical support centre~~** ~~(Foot note)~~ **Requirement 67 - Emergency response facilities on the site** **The nuclear power plant shall include the necessary emergency response facilities on the site (see GSR Part 7). Their design shall be such that personanel will be able to perform expected emergency management tasks under conditions generated by accidents and/or hazards.** **~~An on-site technical support centre, separate from both the plant control room and the supplementary control room, shall be implemented from which technical support can be provided to the operation staff during accident conditions.~~** ~~Footnote: Other facilities for the management of emergencies such as the Emergency Centre are addressed in GSR Part 7: Emergency Preparedness and Response~~		

	from accident conditions. The emergency control centre shall include the necessary systems and services to permit extended periods of occupation and operation by emergency response personnel.	room and other important locations at the plant, and with on-site and off-site emergency response organizations. ~~Appropriate measures shall be taken to protect the occupants of the emergency control centre for a protracted time against hazards resulting from accident conditions. The emergency control centre shall include the necessary systems and services to permit extended periods of occupation and operation by emergency response personnel.~~ 6.42a The technical support centre shall remain operable and habitable for a protracted period of time in situations generated by accidents and hazards considered in the design of the plant. This requirement shall be fulfilled with significant margins. Paragraph 6.40 on Control room should also be modified to be consistent with 6.42a: 6.40a The control room shall remain operable and habitable for a protracted period of time in situations generated by accidents and hazards considered in the design of the plant. This requirement shall be fulfilled with significant margins.	6.42. Information about important plant parameters and radiological conditions at the nuclear power plant and in its immediate surroundings shall be provided to the relevant emergency response facilities ~~in the on-site technical support centre~~. ~~The on-site technical support centre~~Each facility shall be ~~provide~~ provided with means of communication with, as appropriate, the control room, the supplementary control room and other important locations at the plant, and with on-site and off-site emergency response organizations. ~~6.42a The technical support centre shall remain operable and habitable for a protracted period of time in situations generated by accidents and hazards considered in the design of the plant. This requirement shall be fulfilled with significant margins.~~ ~~Paragraph 6.40 on Control room should also be modified to be consistent with 6.42a:~~ 6.40a The control room shall remain operable and habitable for a protracted period of time in situations generated by accidents and hazards. ~~considered in the design of the plant. This requirement shall be fulfilled with significant margins.~~		
Finland **SSR-2/1** **10**	**Requirement 67:** **An on-site or off-site technical support centre, separate from both the plant control room and the supplementary control room, shall be implemented from which technical support can be provided to the operation staff during accident conditions.**	Technical support center should be defined in the glossary. The difference of technical support center and the emergency response center should be clear. Could this be integrated to the emergency response center. The function of technical support center should be clarified. The requirements on Emergency Centre should be included in the document, as far as they are part of the design requirements of this facility.	**General consideration :** **All MS comments have been considered. Most of them are aimed at improving the clarity of the text but is practically impossible to conciliate all of them. Only slightly modifications have been included.**		
Germany **SSR-2/1** **34**	**Requirement 67:** **An on-site technical support centre, separate from both the plant control room and the supplementary control room, shall be implemented from which the operational crisis team ~~technical support~~ can provide their decisions on the measures to be taken to the operation staff during accident and severe accident conditions according to the applied regulations.** Footnote 14: Other facilities for the management of emergencies ~~such as the Emergency Centre~~ are addressed in GSR Part 7: ~~Emergency~~ Preparedness and Response for a Nuclear or Radiological Emergency.	Here a more clear indication is needed. Typically the Crisis Team or TSO gets responsible for the decisions to be taken well before we get into a severe accident. It is not just only technical support to the operation staff – it is decision making, while the operation staff will follow and perform the actions decided by the crisis team. The technical support centre is used as the location for the crisis team. This should be described here. As well conflicts with the other documents reviewed are to be prevented.			
Ukraine **12**	**Requirement 67** Add at the end: **Technical support centre may be located both in separated facility and be part of emergency centre**	In terms of economic considerations: requirements imposed to equipment and systems reliability of technical support centre must be the same as for emergency centre, so for the cost reduction purposes the opportunity of combining these two centres under single physical facility shall be considered			

USA 6 **Case** **(RES)**	6.39, 6.40, 6.40a 6.39 Appropriate measures…or explosive or toxic gases, consistent with Requirement 20. 6.40a The control room shall remain operable and habitable for a protracted period of time in design extension conditions ~~situations generated by accidents and hazards~~ considered in the design of the plant. ~~This requirement shall be fulfilled with significant margins.~~ 6.40b Special attention shall be paid to identifying those events, both internal and external to the control room, beyond accident conditions, that could challenge its continued operation, and the design shall provide for reasonably practicable measures or additional margin to minimize the consequences of such events.	The present requirements do not provide a coherent set of guidelines to be used for control room design, with respect to the existing requirements 19 and 20. The rewrite clearly delineates which criteria are for DBA, which are for DECs, and which are for all other considerations.			
Canada **22**	6.40 a Replace with the following text: "The design of the control facilities (main control room and secondary control areas) shall be such that necessary operations and monitoring can be performed from one of these locations as required following design basis accidents and design extension conditions. This can be achieved by ensuring that the main control room remains operable and habitable, or through the use of alternate control facilities."	The revised text recognizes for that for certain member states, the provision of a secondary control area for use in responding to certain events is an integral part of the design. The proposed wording provides flexibility and is more in line with current design. This should be re-worded to be performance based. As originally written, some utilities will not be able to meet the requirement for all accidents and hazards considered in the design, for example, control room fire.			
Finland **SSR-2/1** **9**	6.40a The control room shall remain operable and habitable for a protracted period of time in situations generated by accidents ~~and~~ hazards considered in the design of the plant. ~~This requirement shall be fulfilled with significant margins.~~	This should be modified so that the need for the supplementary control room is clear. Also threads should be included. Is there a special need to emphasize the analysis of margins in connection to req. 6.40a ? In practice this should be included into every requirement.			
Germany **SSR-2/1** **33**	6.40a The control room shall remain operable and habitable for a protracted period of time in situations generated by accident conditions and hazards considered in the design of the plant or as part of accident management. This requirement shall be fulfilled with ~~significant~~ some margins.	The text should include accident management provisions. It is not possible to de-fine which amount of margins is "sufficient". Therefore, the wording should be changed to avoid this undefined term.			
UK 16	6.40a The control room shall remain operable and habitable for a protracted period of time in situations generated by accidents and hazards considered in the design of the plant. This requirement shall be ~~fulfilled~~ addressed via the implementation of appropriate ~~with significant~~ margins within the design of the control room.	Fulfilled is not the correct word in this context. "Significant margin" is an imprecise term.			

France 15	6.40 a The control room <u>(or another suitably equipped location)</u> shall remain operable and habitable for a protracted period of time in situations generated by accidents and hazards considered in the design of the plant. This requirement shall be fulfilled with significant margins.	To allow some flexibility. To ensure significant margins, it could be necessary to implement another "control room".			
ENISS 14	6.40 and 6.40a 6.40.Special attention shall be paid to identifying those events, both internal and external to the control room, <u>including accidents and hazards</u>, that could challenge its continued operation <u>and habitability</u>, and the design shall provide for reasonably practicable measures to minimize the consequences of such events. ~~6.40a The control room shall remain operable and habitable for a protracted period of time in situations generated by accidents and hazards considered in the design of the plant. This requirement shall be fulfilled with significant margins.~~	Simplification. More over current 6.40a is imprecise (protracted ?,)			
WNA 12	6.40a The control room shall remain operable and habitable for a protracted period of time in situations generated by accidents and hazards considered in the design of the plant<u>, where it is not foreseen to assign control to the supplementary control room</u>. This requirement shall be fulfilled with significant margins.	6.40a: Without the addition, this requirement is excessive, as there would be not need for a supplementary control room as required in Req. 66. Alternatively (to be discussed before sending to IAEA): … for <u>the period foreseen in the safety analysis</u> in situations…			
Finland **SSR-2/1** **11**	6.42	See above req. 67			
Finland **SSR-2/1** **12**	6.42a	See above req. 67			
USA 8 (Johnson)	6.42 Change "the on-site technical support system shall provide…" to "the on-site technical support center shall have."	The TSC must have communications, but only people can provide the facilities for communication.			
USA 3 (NRR)	6.42 An on-site technical support center, separate from both the plant control room and the supplementary control room, shall be im~~l~~plemented from ….	The extra letter "l" in the word "implemented" should be removed. Editorial			

ENISS 15	6.42 Information about important plant parameters and radiological conditions at the nuclear power plant and in its immediate surroundings shall be provided in the on-site technical support centre. The on-site technical support centre shall provide means of communication with the control room, ~~the supplementary control room~~ and other important locations at the plant, and with on-site and off-site emergency response organizations.	According to req 66, the supplementary control room is not used in accident conditions, while according to req 67, the TSC is intended for accident conditions. Therefore communications between them is not required (but may be recommended)			
ENISS 16 **WNA 12**	6.42 a ~~The~~ Technical support ~~centre~~ shall be ensured ~~remain operable and habitable~~ for a protracted period of time in situations generated by accidents and hazards considered in the design of the plant. This can be achieved by providing an operable and habitable technical support center designed for situations generated by accidents and hazards or by establishing other means, e.g. an alternative or mobile technical support center. ~~This requirement shall be fulfilled with significant margins.~~	The technical support is the goal, not the functioning of a center – also alternative or mobile centers should be allowed.			
Germany **SSR-2/1** **35**	6.42a The technical support centre shall remain operable and habitable for a protracted period of time in situations generated by accident conditions and hazards considered in the design of the plant. This requirement shall be fulfilled with significant margins.	Modification would be more precise.			
Canada **24**	6.42 a Delete "This requirement shall be fulfilled with significant margins."	It is not clear why this requirement has to be met with significant margins. For design extension conditions, "reasonable confidence" applies.			
Canada **25**	6.42a Replace with the following text: "The technical support centre shall remain operable and habitable for a protracted period of time in situations generated by accidents and hazards considered in the design of the plant. This requirement ~~shall be fulfilled with significant margins and~~ may be met by either suitably hardening the facility to withstand the initiating event and the potential consequential radiological releases following an accident, or by providing for an alternate facility that would be available in such circumstances."	This should be re-worded so that it is performance based. As written, some utilities will not be able to meet the requirement for all accidents and hazards considered in the design. The proposed wording provides flexibility and is more in line with current design. The revised text recognizes that for certain member states, alternate (redundant) facilities from which to execute the technical support centre function may be provided. These could be located at an appropriate distance from the plant, or established as appropriate after the initiating event.			
USA 7 **Case** **(RES)**	6.42a The technical support centre shall remain operable and habitable for a protracted period of time in situations generated by accidents and hazards considered in the design of the plant, or an alternate on-site functionality shall be provided. ~~This requirement shall be fulfilled with significant margins.~~	The concept of significant margins is vague and not consistent with Requirements 17 and 20. An alternate on-site location for the TSC function is often a much more practical solution to low probability DEC situations.			

35.1, 46.16 and 46.17	**Requirement 68: Emergency power supply** **The emergency power supply at the nuclear power plant shall be capable of supplying the necessary power in anticipated operational occurrences and accident conditions, in the event of the loss of off-site power.** 6.43 In the design basis for the emergency power supply at the nuclear power plant, due account shall be taken of the postulated initiating events and the associated safety functions to be performed, to determine the requirements for capability, availability, duration of the required power supply, capacity and continuity.	**Requirement 68: Emergency power supply** **The emergency power supply at the nuclear power plant shall be capable of supplying the necessary power in anticipated operational occurrences and in design basis accidents in the event of the loss of off-site power. The design shall also include a dedicated power source to supply the necessary power in design extension conditions.** New paragraphs under Requirement 68, after 6.44 6.44 a The dedicated power source shall be capable of supplying the necessary power to prevent significant core and spent fuel degradation in the event of the loss of the off-site power combined with the failure of the emergency power source for design basis accidents. 6.44 b The dedicated power source shall be capable of supplying power to the equipment necessary to mitigate the consequences of design extension conditions involving a loss of the off-site power combined with the failure of the emergency power source for design basis accidents. 6.44 c Equipment necessary to mitigate the consequences of a core melt accident shall be supplied by any of the power sources. 6.44 d The dedicated power source shall be independent and physically separated from the emergency power source for design basis accidents. The dedicated back-up power system connection time shall be consistent with battery autonomy. 6.44 e Continuity of DC power shall be ensured such that any short term actions necessary to mitigate the consequences of design extension conditions can be completed despite the loss of the AC power sources and the event that triggered it. New paragraphs under Requirement 68, after 6.45 6.45.a The design shall include the necessary features to enable the use of non-permanent power sources which may be available at the site or not.	**Requirement 68: Design for the loss of the off-site powerEmergency power supply** **The design shall include an emergency power supply at the nuclear power plant shall be capable of supplying the necessary power in anticipated operational occurrences and in design basis accidents in the event of the loss of the off-site power. The design shall also include an dedicated alternate power source to supply, in particular, the necessary power in design extension conditions.** 6.43 In the design basisThe design specification for the emergency power supply and the alternate power source at the nuclear power plant shall take into account the anticipated operational occurences and accident conditions postulated, due account shall be taken of the postulated initiating events and the associated safety functions to be performed and specify, to determine the requirements for capability, availability, duration of the required power supply, capacity and continuity. New paragraphs under Requirement 68, after 6.44 6.44 a The dedicated alternate power source shall be capable of supplying the necessary power to preserve the integrity of the reactor coolant system, to prevent significant core and spent fuel degradation in the event of the loss of the off-site power combined with the failure of the emergency power supply source for design basis accidents. 6.44 b The dedicated power source shall be capable of supplying power to the equipment necessary to mitigate the consequences of design extension conditions involving a loss of the off-site power combined with the failure of the emergency power source for design basis accidents. 6.44 bc Equipment necessary to mitigate the consequences of a core melt accident shall be supplied by any of the power sources. 6.44 cd The dedicated alternate power source shall be independent and physically separated from the emergency power supply source for design basis accidents. The connection time of the dedicated alternate back-up power source system connection time shall be consistent with battery autonomy. 6.44 e Continuity of DC power shall be ensured such that any short term actions necessary to mitigate the consequences of design extension conditions for safety can be completed despite in the event of athe loss of the AC power sources and the event that triggered it. New paragraphs under Requirement 68, after 6.45 6.45.a The design shall include the necessary features to enable the use of

			~~non-permanent power sources which may be available at the site or not~~. To strengthen defence in depth, the design shall include features to enable the safe use of non-permanent equipment to restore the necessary electrical power supply. Footnote XX		
Germany **SSR-2/1** **36**	**Requirement 68: Emergency power supply** **The emergency power supply at the nuclear power plant shall be capable of supplying the necessary power in anticipated operational occurrences and in design basis accidents ~~conditions~~, in the event of the loss of off-site power. The design or accident management provisions shall also include an alternate AC ~~dedicated~~ power source to supply the necessary power in design extension conditions.**	The formulation should be corrected to allow application for current and next generation plants. In the new DS430 the "alternate AC power source" is defined as power supply to the plant during station blackout and other de-sign extension conditions. Therefore I think we should use here the same terminology (dedicated power source => alternate AC power source).	**General consideration :** **All MS comments have been considered. and a new text with some simplifications is proposed . No detailed resolution is provided to each comment.**		
Ukraine **13**	**Requirement 68** **The emergency power supply at the nuclear power plant shall be capable of supplying the necessary power in anticipated operational occurrences and in design basis accidents in the event of the loss of off-site power. The design shall also include a dedicated power source to supply the necessary power in design extension conditions or a possibility of the emergency power supply sources renewal within the minimum allowed time for BDBA conditions in the design.**				
Pakistan **8**	6.44 may be re-write as The combined means to provide emergency power (such as by means of water, steam or gas turbine, diesel engines, batteries or mobile power generators) shall have a reliability and form that are consistent with all the requirements of the safety systems to be supplied, and shall perform their functions *for longer durations* on the assumption of a single failure. It shall be possible to test the functional capability of the emergency power supply.	During the prolonged loss of offsite condition, after the smashed of batteries and no AC power available to operate equipment, the operators may not be able to understand the condition of the reactors, containments, and spent fuel pools because instrumentation may either lacking or not functioning properly due to loss of power. This scenario compels PNRA to consider in our analysis the combined means to provide emergency power having a reliability and form that are consistent with all the requirements of the safety systems to be supplied, and to perform their functions *for longer durations* on the assumption of a single failure.			
USA 9 (Johnson)	6.44 Provide separate requirements for electrical power systems to deal with Station Blackout and Extended Station Blackout (severe accidents).	The requirement and the supporting statements seem to convolve requirements for Station Blackout and Fukushima-like losses of power. It does not adequately deal with either. SBO's have proven to be one of the most common, serious multiple-failure events in NPP. For more severe events, Fukushima demonstrated that failure of AC sources is not the only concern. Indeed, AC sources WERE AVAILABLE at Fukushima. The ultimate problems were failures of the AC AND DC electrical distribution systems.			

USA 10 (Johnson)	6.44 Consider replacing all DEC requirements 6.44a - e with a simple requirement that the electrical power system shall have capacity, capability, and qualification to ensure the continued operability of equipment provided to meet Requirements 20, 53, 58, 59, 65 and 67. Place after new requirement after existing 6.45.	There may be various approaches to ensuring the ability to respond to severe accidents. The proposed requirements, may not be applicable to all cases – e.g., where cooling is provided by engine driven pumps. Details can be provided in the electrical safety guide.			
USA 11 (Johnson)	6.44a For SBO the dedicated power source should be sufficient to ensure that the core and spent fuel are cooled and containment integrity is maintained. Existing wording may be sufficient for Fukushima-like events, except that it should apply to power systems not power sources.	Conditions allowed for SBO are too severe. Requirements for Fukushima-events are too limited.			
France 16	6.44 a & b 6.44 a The dedicated power source shall be capable of supplying power to the equipment ~~the~~ necessary ~~power~~ : - to prevent significant core and spent fuel degradation in the event of, or - to mitigate the consequences of design extension conditions involving the loss of the off-site power combined with the failure of the emergency power source for design basis accidents. The dedicated power source shall be designed with margin enabling it accommodate external hazards of a severity or duration significantly exceeding that derived from the site evaluation ~~6.44 b The dedicated power source shall be capable of supplying power to the equipment necessary to mitigate the consequences of design extension conditions involving a loss of the off-site power combined with the failure of the emergency power source for design basis accidents.~~	Simplification			

UK 17	6.44 a – e 6.44 a The dedicated power source shall be capable of supplying the necessary power to prevent significant core and spent fuel degradation as well as mitigating the consequences of a degradation in the event of loss of the off-site power combined with the failure of the emergency power source. 6.44 b The dedicated back-up power system connection time shall be consistent with battery autonomy. 6.44 c Continuity of DC power shall be ensured such that any short term actions necessary in the interest of safety can be completed despite the loss of the AC power sources.	There was a significant amount of repetition in the original wording of these bullet points. This proposal is more concise.			
Canada **26**	Requirement 68 / Clauses 6.44 / 6.44a / 6.44c In this section on Emergency Power Supply, the updated text also includes a new specific requirement for design extension conditions: "The design shall also include ~~a dedicated~~ an alternate power source to supply the necessary power in design extension conditions". However, within this section on Emergency Power, Clause 6.44 refers primarily to design basis emergency power, indicating that: "The combined means to provide emergency power… shall have a reliability and type that are consistent with all the requirements of the safety systems to be supplied with power…". 6.44 Change: "~~The combined means to provide emergency power….~~" To: "The combined means to provide emergency power for design basis accidents….". It is further recommended that the discussion under Emergency Power Supply be divided into a section on design basis provisions and a separate section on design extension condition provisions.	This recognizes that for certain member states, the design reliability and type of the beyond design basis emergency power generators or pumps may not meet the same requirements of the safety systems to be supplied with power. It further recognizes that emergency power for design extension conditions may power only a limited set of equipment lineups to provide mitigation of the consequences of a core melt. It is not clear why the power source must be dedicated. Any alternate power source is acceptable. "dedicated" should also be changed in 6.44a, b and d.			
Germany **SSR-2/1** **37**	6.44a The alternate AC ~~dedicated~~ power source shall be capable of supplying the necessary power to prevent significant core and spent fuel degradation in the event of the loss of the off-site power combined with the failure of the emergency power source for design basis accidents.	In the new DS430 the "alternate AC power source" is defined as power supply to the plant during station blackout and other de-sign extension conditions. Therefore I think we should use here the same terminology (dedicated power source => alternate AC power source).			

USA 12 (Johnson)	6.44b Change to account for the fact that distribution systems may also fail during DEC.	Distribution system failure was at the root of the inability to power systems at Fukushima. It is not clear that we can identify all possible situations in which plant distribution can fail. Plants should be prepared for the unexpected.			
Germany **SSR-2/1** **38**	6.44b The alternate AC ~~dedicated~~ power source shall be capable of supplying power to the equipment necessary to mitigate the consequences of design extension conditions involving a loss of the off-site power combined with the failure of the emergency power source for design basis accidents.	In the new DS430 the "alternate AC power source" is defined as power supply to the plant during station blackout and other de-sign extension conditions. Therefore I think we should use here the same terminology (dedicated power source => alternate AC power source).			
Belgium **8**	6.44 b ~~The~~A dedicated power source shall be capable of supplying power to the equipment necessary to mitigate the consequences of design extension conditions involving a loss of the off-site power combined with the failure of the emergency power source for design basis accidents. ~~6.44 c Equipment necessary to mitigate the consequences of a core melt accident shall be supplied by any of the power sources.~~	The power supply for mitigative provisions is covered in 6.44 b. The additional requirement from 6.44 c is not clear.			
Japan **3**	6.44b The dedicated power source shall be capable of supplying power to the equipment necessary to mitigate the consequences of design extension conditions including ~~involving~~ a loss of the off-site power combined with the failure of the emergency power source for design basis accidents.	Better wording			
ENISS 17 **WNA 13**	6.44 a and b 6.44a The dedicated power source shall be capable of supplying the necessary power to ~~prevent significant core and spent fuel degradation in the event of the loss of the off-site power combined with the failure of the emergency power source for design basis accidents.~~ ~~6.44b The dedicated power source shall be capable of supplying power to the~~ equipment needed in ~~necessary to mitigate the consequences of~~ design extension conditions involving a loss of the off-site power combined with the failure of the emergency power source for design basis accidents.	Combine both paras, as DEC includes preventing core melt and mitigating consequences			

USA 13 (Johnson)	6.44c Limit to installed equipment	This would be quite difficult to implement if it is intended to apply to transportable equipment that may be the primary means of coping with DEC			
USA 14 (Johnson)	6.44c Change to "capable of being powered from the preferred, emergency power, or SBO power sources."	As currently written the requirement may be interpreted as meaning one power source without limitation of which one. As currently written it might also be interpreted to must be possible to power equipment from all plant power sources, including, for example, DC supplies.			
France 17	6.44 c **It shall be possible to supply the** equipment necessary to mitigate the consequences of a core melt accident **from the relevant** ~~supplied by any of the~~ power sources **that would remain available**.This shall be taken into account with due consideration to common cause failure and independency of level of defence in depth.	Common feature of all power supply (switchboard for example) could initiate a common cause failure between feature of level 3 and 4.			
ENISS 18 **WNA 13**	6.44 c Provisions shall be in place so that ~~E~~equipment necessary to mitigate the consequences of a core melt accident **can** ~~shall~~ be supplied by any of the power sources.	For clarification, also mobile or temporary connections are allowed.			
Belgium **9**	6.44 d The dedicated power source shall be independent and physically separated from the emergency power source for design basis accidents. The dedicated back-up power system connection time shall be consistent with all time constraints including battery autonomy.	Battery power is not the only time constraint that could appear in an accident scenario			
Germany **SSR-2/1** **39**	6.44 d The alternate AC ~~dedicated~~ power source shall be independent and physically separated from the emergency power source for design basis accidents. The alternate AC ~~dedicated back-up~~ power system connection time shall be consistent with battery autonomy.	In the new DS430 the "alternate AC power source" is defined as power supply to the plant during station blackout and other de-sign extension conditions. Therefore I think we should use here the same terminology (dedicated power source => alternate AC power source).			
Japan	6.44 d The dedicated power source shall be independent and physically separated from the emergency power source for design basis accidents. The dedicated back-up power system connection time shall be matched up to ~~consistent with~~ battery autonomy.	Enforcement			

USA 15 Johnson)	6.44e Change to "Continuity of DC power during design extension conditions shall be assured such that actions necessary to mitigate the consequences of DEC can be completed, and the long-term capability of DC power can be assured. The DC power system shall include equipment survivability features consistent with Requirement 20."	DC power is still needed after AC power is restored. There may be a need for a separate requirement that the DC power source shall have sufficient capacity to deal with the longest conceived loss of AC. The phrase, "and the event that triggered it," is an incomplete summary of the equipment survivability features contained in Requirement 20 (5.29).			
Japan	6.44 e Continuity of DC (Direct Current) power shall be ensured such that any short term actions necessary to mitigate the consequences of design extension conditions can be completed despite the loss of the AC (Alternative Current) power sources and the event that triggered it.	Definition of DC and AC. Clarify a concrete example for better understanding. What situation is this paragraph assumed, e.g. SR/V operation by DC power source in case of RCIC operation for BWR.			
France 18	6.44 e) Continuity of ~~DC~~ power, including through DC power, shall be ensured such that any short term actions necessary to mitigate the consequences of design extension conditions can be completed despite the loss of the ~~AC~~ emergency power sources and the event that triggered it	It could be understood that it is not possible to loose DC emergency power, that is not consistent with requirement 68			
ENISS 19	6.44 e ~~Continuity of DC power shall be ensured such that any short term actions necessary to mitigate the consequences of design extension conditions can be completed despite the loss of the AC power sources and the event that triggered it.~~	These electric power requirements are very prescriptive and could lead to a non-optimal response for a particular design of plant. [e.g it might be preferable in some cases to provide emergency pumps with tie-in points for cooling and not attempt to achieve the same through emergency power supplies to existing pumps. Requirements have to be "technology neutral". Furthermore the requirement is unclear : - It can be understood as loss of all AC power sources, without consideration of the resistance of the dedicated source. This is not justified as there is no reason that DC sources are more resistant than AC ones (it would be better to specify resistance of AC power) - it can be understood as loss of AC power except dedicated sources, and in this case it is fully redundant with 6.44d.			
Finland **SSR-2/1** **13**	6.45 a The design shall include the necessary features to enable the use of non-permanent power sources which ~~may~~should be available on demand ~~at the site or not.~~	Clarify Should be available			

Germany **SSR-2/1** **40**	6.45a The design shall include ~~the~~ necessary features (e.g. capability of connecting electrical power sources) to enable the use of non-permanent connected power sources (stationary and/or mobile) which may be available at the site ~~or not~~.	We need an example for the 'necessary features', so that everyone know what we think about. The meaning of 'non-permanent' power sources is not clear. We mean 'non-permanent connected' power sources. In addition, we should require that both stationary and/or mobile power sources are available at the plant site.			
Canada **27**	6.45a The design shall include the necessary features to enable the use of non-permanent power sources which ~~may be available at the site or not~~ should be connectable within the time available for successful mitigating action.	"At the site or not" is self-cancelling. The important thing about non-permanent power sources is that they must be connectable within the time available for mitigating action.			
Ukraine **14**	6.45a It is necessary to specify that it is valid for new units, and not for all units including operating ones				
ENISS 20 **WNA 13**	6.45a The design shall include the necessary features to enable the use of non-permanent power sources ~~which may be available at the site or not~~.	The last part does not give added value.			

LL	Current text	Proposal for Member States consultation	Proposed resolution of MS comments
42.1	**Requirement 80 Fuel handling and storage system** 6.68. For reactors using a water pool system for fuel storage, the design of the plant shall include the following: a) Means for controlling the temperature, water chemistry and activity of any water in which irradiated fuel is handled or stored; b) Means for monitoring and controlling the water level in the fuel storage pool and	**Requirement 80 Fuel handling and storage system** 6.68 With the goal to practically eliminate significant releases, for reactor using a water pool system for fuel storage, the design shall : a) provide the necessary spent fuel pool cooling capabilities to prevent the uncovering of the fuel assemblies in operational states and accident conditions relevant for the spent fuel pool, b) provide features to prevent the uncovering of the fuel assemblies in the event of a leak or pipe break c) provide capabilities to restore the water inventory d) include the following: 1) Means for monitoring and controlling the water temperature in operational states and accident conditions relevant for the spent fuel pool;	**Requirement 80 Fuel handling and storage system** 6.68 With the goal to practically eliminate ~~significant~~early or large releases and to avoid high radiation fields on site, for reactors using a water pool system for fuel storage, the design shall prevent the uncovering of the fuel assemblies in all plant states relevant for the spent fuel pool. It shall: ~~a) provide the necessary spent fuel pool cooling capabilities to prevent the uncovering of the fuel assemblies in operational states and accident conditions relevant for the spent fuel pool,~~ a) provide features to prevent the uncovering of the fuel assemblies in the event of a leak or pipe break b) provide capabilities to restore the water inventory c) To strengthen defence in depth, the design shall include features to enable

	means for detecting leakage; c) Means for preventing the uncovering of fuel assemblies in the pool in the event of a pipe break (i.e. anti-siphon measures).	2) Means for monitoring the water level in operational states and accident conditions relevant for the spent fuel pool; 3) Means for monitoring the activity in water and air in operational states and accident condition relevant for the spent fuel pool ; 4) Means for monitoring water chemistry in operational states; 5) Means to enable the use of non-permanent equipment to ensure the long term spent fuel pool cooling. The non-permanent equipment may be available at the site or not.	the safe use of ~~Means to enable the use of~~ non-permanent equipment to ensure water inventory for ~~the~~ long term spent fuel ~~pool~~ cooling and shielding against radiation [Footnote XX]. ~~The non-permanent equipment may be available at the site or not will not necessarily be required to be stored on site.~~ 6.68~~a~~ The design shall include the following: a) Means for monitoring and controlling the water temperature in operational states and accident conditions relevant for the spent fuel pool; b) Means for monitoring and controlling the water level in operational states and accident conditions relevant for the spent fuel pool; c) Means for monitoring and controlling the activity in water and air in operational states and for monitoring the activity in water and air in accident condition relevant for the spent fuel pool ; d) Means for monitoring and controlling water chemistry in operational states; ~~d)e) Means for monitoring and controlling the hydrogen.~~ ~~b) Means to enable the use of non-permanent equipment to ensure the long term spent fuel pool cooling. The non-permanent equipment may be available at the site or not will not necessarily be required to be stored on site.~~		
		No initial IAEA proposal			
Japan **6**	**Requirement 80: Fuel handling and storage system** **Fuel handling and storage systems shall be provided at the nuclear power plant to ensure that the integrity and properties of the fuel are maintained ~~at all times~~ in operational states and accident conditions relevant for the spent fuel pool during fuel handling and storage.**	Clarify operational states and accident conditions consisted with para. 6.68 a).			**The new 6.68a addresses all plant states relevant to the storage system.** **There is no need to repeat the same concept in Req. 80 that implicitly includes (at all times) accidents.**
Russia 14	6.68 first sequence With the goal to reduce the probability of~~practically eliminate~~ significant releases to the lowest	Proposal has the aim to avoid usage of uncertain term “practical elimination”			“Practical elimination” is preferred (new concept)

	achievable level, for reactor using a water pool system for fuel storage, the design of the plant shall :				
France 19	6.68 With the goal to practically eliminate **significant** releases **and to avoid long term off-site contamination,** for reactor using a water pool system for fuel storage, the design shall : **a) be such that the structural integrity of the spent fuel pool is ensured even in case of severe external hazard significantly exceeding that considered in the desgin basis** b) provide the necessary spent fuel pool cooling capabilities to prevent the uncovering of the fuel assemblies in operational states and accident conditions relevant for the spent fuel pool,	With the goal to practically eliminate **significant** releases **and to avoid long term off-site contamination,** for reactor using a water pool system for fuel storage, the design shall : **a) be such that the structural integrity of the spent fuel pool is ensured even in case of severe external hazard significantly exceeding that considered in the desgin basis** b) provide the necessary spent fuel pool cooling capabilities to prevent the uncovering of the fuel assemblies in operational states and accident conditions relevant for the spent fuel pool,			**SSR 2/1 is not aimed at listing items which have to withstand hazrda exceeding those considered with the site evaluation**
ENISS 21	6.68 With the goal to practically eliminate significant early or large releases, for reactors using a water pool system for fuel storage, the design shall:	see. 2.13 (4)			
ENISS 22 **WNA 14**	6.68 and a to d 6.68 With the goal to practically eliminate significant large or early releases and to avoid long term off-site contamination, for reactor using a water pool system for irradiated fuel storage, the design shall : a) provide the necessary spent fuel pool cooling capabilities to prevent the uncovering of the fuel assemblies in operational states and accident	For completion and clarification See 2.13 (4) There is a logical break in the new requirements, as (a) is the overarching requirement, and (b) and (c) are included in it – they can be deleted.			**a) is in case of the loss of the cooling capabilities** **b) Is in case of loss of coolant**

	conditions relevant for the spent fuel pool. ~~(b) provide features to prevent the uncovering of the fuel assemblies in the event of a leak or pipe break;~~ ~~c) provide capabilities to restore the water inventory~~ ~~d)~~ It includes the following: 1) Means for monitoring and controlling the water temperature in operational states and accident conditions relevant for the spent fuel pool; 2) Means for monitoring the water level in operational states and accident conditions relevant for the spent fuel pool; ~~3) Means for monitoring the activity in water and air in operational states and accident condition relevant for the spent fuel pool ;~~ ~~4) Means for monitoring water chemistry in operational states;~~ 5) Alternative ~~M~~means to enable the use of non-permanent equipment to ensure the long term spent fuel pool cooling. ~~The non-permanent equipment may be available at the site or not.~~	Nr. 3 and 4 are not needed for achieving the goal of practically eliminating large releases from the fuel pool. Part of Nr. 5 doesn't offer any added value.			
Japan **7-1**	6.68 With the goal to practically eliminate significant releases, for reactors using a water pool system for fuel storage, the design shall :	Editorial	**Accepted**		
Finland	6.68 c provide capabilities to restore and adequately monitor of the water	clarity,	**Accepted**		

<table>
<tr><td>SSR-2/1

14</td><td>inventory</td><td>SSR-2/1 is requirements level document</td><td></td><td></td><td></td></tr>
<tr><td>Japan

7-2</td><td>6.68 c)provide capabilities to restore the cooling water inventory</td><td>Clarification. Inventory is normally used for nuclear materials, therefore specific description should be needed.

And be consisted with the title of requirement 49.</td><td></td><td></td><td>X English</td></tr>
<tr><td>Japan

7-3</td><td>6.68 d)include the following:
1) Means for monitoring and controlling the water temperature in operational states and accident conditions relevant for the spent fuel pool;
2) Means for monitoring and controlling the water level in operational states, and accident conditions relevant for the spent fuel pool;
3) Means for monitoring and controlling the activity in water and air in operational states, and for monitoring it in accident conditions relevant for the spent fuel pool ;
4) Means for monitoring and controlling water chemistry in operational states;
Means to enable the use of non-permanent equipment to ensure the long term spent fuel pool cooling. The non-permanent equipment may be available at the site or not.</td><td>d) 2), 3), 4) Keep the original SSR-2/1 para. 6.68 (a) as it is. They should be also consisted with NS-G-1.4 para.3.29 and SSG-15 para. 6.103. See attached table-1 as summarized.

Table 1 Comparison of parameters stated in the current and proposed text in 6.68
<table>
<tr><td>Parameter</td><td colspan="2">Water Temperature</td><td colspan="2">Water chemistry</td><td colspan="2">Water activity</td><td colspan="2">Water level</td></tr>
<tr><td>Plant States</td><td>operational states</td><td>accident conditions</td><td>operational states</td><td>accident conditions</td><td>operational states</td><td>accident conditions</td><td>operational states</td><td>accident conditions</td></tr>
<tr><td>Current Text</td><td colspan="6">Control
any water in which irradiated fuel is handled or stored</td><td colspan="2">Monitor and control
in SFP and detecting leakage</td></tr>
<tr><td>IAEA Proposed Text</td><td colspan="2">Monitor and control</td><td>Monitor</td><td>—</td><td>Monitor</td><td>Monitor</td><td colspan="2">Monitor</td></tr>
<tr><td>Japan comments</td><td colspan="2">Monitor and control</td><td>Monitor and control</td><td>—</td><td>Monitor and control</td><td>Monitor</td><td colspan="2">Monitor and control</td></tr>
</table></td><td>Accepted</td><td></td><td></td></tr>
<tr><td>Canada

28</td><td>6.68 d 1)

“Means for monitoring and, where practicable, controlling the water temperature in operational states and accident conditions relevant for the spent fuel pool;”</td><td>Control of temperature will not be possible for all accident conditions.</td><td></td><td></td><td>x</td></tr>
<tr><td>France
20</td><td>6.68 d 4) 4) Means for monitoring and controlling water chemistry in operational states;</td><td>Monitoring is not enough (fuel integrity and radiation protection needs adequate water chemistry)</td><td>Accepted</td><td></td><td></td></tr>
</table>

Canada **29**	6.68 d 5) "The non-permanent equipment ~~may be available at the site or not~~ should be connectable within the time available for successful mitigating action."	As for comment **Error! Reference source not found.**.			**The requirement deals with the long term of the accident**
UK 18	6.68 d 5) Means to enable the use of non-permanent equipment to ensure the long term spent fuel pool cooling. The non-permanent equipment will not necessarily be required to be stored on site. ~~may be available at the site or not.~~	"May be available at the site or not" is not the best way of expressing this requirement	**Accepted**		
France 21	6.68 d 5) Means to enable the use of non-permanent equipment (which may be available at the site or not) to ensure the long term spent fuel pool cooling. ~~The non-permanent equipment may be available at the site or not~~.	Simplification		**See UK 18**	
Germany **SSR-2/1** **41**	6.68 With the goal to practically eliminate significant releases of radionuclides, for reactors using a water pool system for fuel storage, the design of the plant or provisions made in accident management concepts shall: (a) provide the necessary spent fuel pool cooling capabilities to prevent the uncovering of the fuel assemblies in all operational states ~~and accident conditions relevant for the spent fuel pool~~; (b) provide features to prevent the uncovering of the fuel assemblies in the event of a leak or pipe break; (c) provide additional capabilities to restore/to retain the water inventory in case the designed capabilities fail;	Is it important to think about the location of the SFP? Some PWRs have the spent fuel pools inside the containment which has dedicated consequences to the possible measures, others not. Many additional provisions have been installed or will be installed as part of accident management now after Fukushima. This should be considered as well. As severe accidents in SFP are to be considered as well, measurement and control of hydrogen and radionuclides in the atmosphere is requested as well.	**5) Is accepted for hydrogen**		**Req 68 has been strengthened to prevent fuel melting.**

	(d) include the following: 1) Means for monitoring and controlling the water temperature in all operational states~~ and accident conditions relevant for the spent fuel pool~~; 2) Means for monitoring the water level in all operational states ~~and accident conditions relevant for the spent fuel pool~~; 3) Means for monitoring the activity in water~~ and air~~ in all operational states ~~and accident condition relevant for the spent fuel pool ~~; 4) Means for monitoring water chemistry in all operational states; 5) Means to enable the use of non-permanent equipment to ensure the long term spent fuel pool cooling. The non-permanent equipment may be available at the site or not; 6) Means for monitoring and controlling the hydrogen and radionuclide concentration in the atmosphere of the spent fuel pool confinement.				