DS508 Assessment of the Safety Approach for Design Extension Conditions and Application of the Concept of Practical Elimination in the Design of Nuclear Power Plants, Version 8th June 2022, STEP 11

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
UK		General	It is noted that this draft has been significantly revised in response to Member State comments. As a result of that, the UK has perhaps more comments below than might be expected at Step 11. However, we have no fundamental objections to the technical contents of the draft (given the subject and the multiple views on practical elimination at the start of this work, this quite an achievement) and consider this latest version to be an improvement on versions that went before					
UK	1	Throughout	Consider consistent usage of 'acceptance criteria' and 'acceptable limits'	Both of these terms are used throughout the guide - it assumed they are intended to have the same meaning. Suggest the usage is rationalised for consistency, noting that the term 'acceptable limits' is used in the quotes from SSR 2/1 (e.g. 2.2, 2.4, 3.11).	X			Radiological acceptance criteria used for deterministic safety analysis (used in SSG-2 (Re.1) are equivalent to acceptable limits. A footnote is added for clarification.
Canada	58	Definition	*Ensuring ~~by design~~ that plant event sequences that could lead to an early radioactive release or a large radioactive release are either physically impossible or are considered, with a high level of confidence, to be extremely unlikely to arise.*	Not all methods of ensuring practical elimination are design based. For example, boron dilution accidents are partly protected by procedures. Pressure vessel failures are practically eliminated by a combination of design, monitoring, inspection and procedural methods.		X Ensuring by implementing safety provisions in the form of design and operational features~~design~~ that plant event sequences that could lead to an early radioactive release or a large radioactive release are either physically impossible or are considered, with a high level of confidence, to be extremely unlikely to arise.		

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ENISS	26	Definition	~~The concept of practical elimination is applied in relation to event sequences for which reasonably practicable technical means for their mitigation cannot be implemented.~~	This note is making the concept of practical elimination limited to large an early releases as explained in para 4.7. Suggestion is to remove this note.			X	The note is, as mentioned, in compliance with para 4.7 and the second note complements the intention of considering the application of the practical elimination as part of the defense in depth approach. This is in compliance with requirements in para 5.31 of SSR-2/1 (Rev.1)

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UK	2	1.1 & footnote 3	Ensure the wording used in 1.1b) is consistent with the new definition of practical elimination (page 46). Consider whether the references to SSR 2/1 and the extant Glossary ([1,2]) in footnote 3 of this guide are still appropriate given the new definition.	The wording in the definition on page 46 is acceptable, but it needs to be clear how this is now being used in the new guide. Some explanatory text in Section 1 may help. 1.1b) is referring to footnote 3 which then includes references to SSR 2/1 and the extant Glossary. The text in footnote 3 is slightly different to that in SSR 2/1 (and associated footnote 4), the Glossary and also that in the new Definition. This is introducing further variations in wording which are not fully self-consistent; whilst the meaning is essentially the same, this may introduce confusion.	X			Footnote 3 modified to make reference to the Definition section.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Germany	1	1.2 Last sentence	Specific requirements for safety assessment and safety analysis of nuclear power plants are established in SSR-2/1 (Rev. 1) [1] as well as in the specific safety guides SSG-2 (Rev. 1) [9], SSG-3 [10] and SSG-4 [11].	SSG-2 Rev.1, SSG-3 and SSG-4 should be added here as they are important specific requirements for safety assessment and analysis of NPPs too.			X	Even though recommendations related to the safety assessment are presented in the IAEA safety guides mentioned, the text refers only to the IAEA safety requirements related to the safety assessment (e.g., Req. 10 in SSR-2/1 (Rev.1) and GSR Part 4 (Rev.1) requirements).
Japan	1	1.8.	As described in para. 2.13 of SSR-2/1 (Rev. 1) [1], defence in depth at nuclear power plants comprises five levels. Plant states considered in the design correspond to one or more levels of defence in depth. This Safety Guide is structured in terms of the design of safety provisions necessary for each plant state, rather than for each level of defence in depth. In this way, the significance and importance of design extension conditions for the safety approach is emphasized.	The term "safety provisions" appears many times in this draft. Please clarify a definition of safety provisions, which is not appeared in SSR-2/1 (Rev. 1).	X			A footnote is added to define design safety provision as: Design safety provisions are considered in this safety guide as the design solutions applied to structures, systems and components to ensure their required level of safety.
Ukraine	1	1.9	This Safety Guide considers the assessment of the independence of defence-in-depth levels and, in a general manner, the assessment of independence of structures, systems and components implemented at different defence-in-depth levels	To ensure consistency with IAEA SF-1 para. 3.31, IAEA SSR-2/1 (Rev.1) requirement 7, 4.13A	X			

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Canada	1	1.9 1st sentence	*This Safety Guide considers the assessment of the degree of independence between levels of defence in depth and, in a general manner, the assessment of independence of structures, systems and components.*	SSR-2/1 Requirement 7 is for independence between the levels of defence. It is also to the extent practicable and so is not an absolute requirement. Suggest additional text to make this clear.	X			
Canada	2	1.11 Editorial	Check references.	Reference [9] is used for SSG-2 and SSG-3.	X			
France	1	1.12	Section 2 sets out the requirements in SSR-2/1 (Rev. 1) [1] that govern the approach to design of nuclear power plants relating to prevention ~~the avoidance~~ of ~~unacceptable~~ radiological consequences, on which the recommendations in this Safety Guide are based.	To be consistent with the guidance itself, notably chapters titles Another solution is to use the title of chapter 2	X			
France	2	1.13	Annex I provides examples of cases of practical elimination that may differ between the different Member States. Annex II provides some considerations for the application of recommendations included in this Safety Guide to nuclear power plants designed to earlier standards.	See comment on annex 1	X			
UK	3	3.3	In relation to "reactor core" include a footnote to explain that this covers the core in the reactor pressure vessel and in the spent fuel pool.	Guidance also covers consideration of the SFP. Improvement to wording for the avoidance of doubt.		X … The specific focus of this Safety Guide is on the reactor core in the reactor pressure vessel and in the spent fuel pool, as the main source of radioactivity		
Japan	2	3.4.	(c) The independence, ~~as far as applicable~~ as far as practicable, of the safety provisions at that level, including their physical separation, from the safety provisions associated with the previous levels of defence in depth.	To keep a consistency with 4.13A of SSR-2/1 (Rev. 1).	X			

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UK	4	3.5	In 1st & 4th sentences change to: "…are associated with…." In 2nd sentence change to "….has resulted in different…."	Typographical error	X			
Japan	3	3.5. /L11-14	Design extension conditions without significant fuel degradation could be understood as those representative event sequences involving either a single initiating event of very low frequency, or an anticipated operational occurrence or ~~frequent~~ design basis accident combined with multiple failures, which ….	Delete "frequent", as design basis accident is assumed to occur infrequently.		X …or an anticipated operational occurrence or ~~frequent~~ infrequent faults of design basis accident combined with multiple failures, which		To be in agreement with Table II-1 in Annex II of SSG-2 (Rev.1).
Canada	3	3.6 2nd sentence	*This approach emphasizes the distinction between the set of to be applied for design extension conditions and the set of rules to be applied for design basis accidents, both in the design and in the safety assessment. Approach 2 also supports SSR-2/1 Requirement 7 and para 5.29 (a) for independence (to the extent practicable) between safety features for DECs and systems for AOO and DBA.*	Approach 2 applies SSR-2/1 more consistently than approach 1 allowing use of best-estimate analysis. Approach 2 supports the SSR-2/1 Requirement 7 and para 5.29 (a) requirement that there should be independence between levels of DiD (to the extent practicable).			X	It was accepted that both approaches comply with SSR-2/1 (Rev.1) 5.29 (a) as mentioned in para. 3.7. There is no need to emphasize one approach versus the other.

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Germany	2	3.7	Despite their differences, both of these approaches are in compliance with para. 5.29 (a) of SSR-2/1(Rev. 1) [1] and support, the implementation~~, to the extent practicable,~~ of independence among safety systems, safety features for prevention of and safety features for mitigation of events considered in the design extension conditions.	The DiD-approaches support the implementation of independence regardless of their practicability. This addition seems unnecessary.			X	This text complies with Requirement 7 of SSR-2/1 (Rev.1) Requirement 7: Application of defence in depth The design of a nuclear power plant shall incorporate defence in depth. <u>The levels of defence in depth shall be independent **as far as is practicable.**</u>
UK	5	3.7	Change to read: "….independence <u>between safety systems and those safety features for the prevention and/or mitigation</u> of events considered in design extension conditions."	Improvement to wording	X			
UK	6	3.8	Change last sentence to read: "Anticipated operational occurrences are reached either directly by the occurrence of a postulated initiating event or through a failure to prevent abnormal operation and failures."	Improvement to wording. Doesn't make sense as written. In the context of this paragraph, plant states other than normal operation must be AOOs. It is not clear what "events" are being referred to.	X			

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Canada	4	3.8 to 3.14	Delete paragraphs 3.8 to 3.14.	The sections on AOO and DBA are not central to the purpose of this safety guide. AOO and DBA are adequately described in SSR-2/1 and SSG-2. The text focuses almost entirely on active systems for prevention or mitigation of AOOs and DBAs. SSR-2/1 para 5.8 places such systems third in priority after inherently safe design, and passive safety. Suggest removing these paragraphs or revising the to better meet SSR-2/1.			X	These paragraphs are needed for the explanation related to the overall implementation of Defence in Depth. Those paragraphs are in line with the scope.
Germany	3	3.9 Last sentence	(c) Prevent anticipated operational occurrences, once they start, from ~~evolving into design basis accidents~~ escalating into accident conditions.	The development of AOO into DEC also needs to be included. By keeping the usual wording, we might avoid confusion.	X			

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European Commission	1	3.10	Remove item 3.10	It seems to add an unnecessary constraint to the design. A designer might choose to focus on reducing the frequency of initiating events rather on the reliability of safety provisions for anticipated operational occurrences. Items 3.38, 3.39 and 3.49 sufficiently cover the need for individually reliable levels of defence-in-depth, without providing a too prescriptive guidance.		… for design basis accidents (usually lower than 10-2 per reactor-year) (see Table II–1 of SSG-2 (Rev.1) [9]).	X	It does not add unnecessary constraint to the design since the recommendation is based on the already approved safety guide on deterministic safety analysis (SSG-2 (Rev.1)). It was added a mention to the reference.
Canada	5	3.10	Provide reference, reword or delete.	What is the reference for this text? SSR-2/1 sets several requirements for reliability, but this does not seem to be one of them. Should the reliability be in "failures per demand" rather than "failures per reactor-year"?	X			Reference provided.

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ENISS	1	3.13	Consequently, specific design provisions (i.e. safety systems) should be implemented to prevent and mitigate the radiological consequences of design basis accidents by preventing significant fuel damage and maintaining the integrity of the containment (i.e. by preserving the structural integrity of the containment and maintaining its associated systems 10). The objective of the safety systems is to limit the radiological consequences for the public and the environment ~~to the extent that no additional safety features or off-site protective actions are necessary for the protection of the public~~ to the extent that these consequences are acceptable for the public and the environment.	The sentence in red is in contradiction with SSR-2/1 req. 20 : "These design extension conditions shall be used to identify the additional accident scenarios to be addressed in the design and to plan practicable provisions for the prevention of such accidents or mitigation of their consequences." And 5.27 : "This might require e additional safety features for design extension conditions, or extension of the capability of safety systems to prevent, or to mitigate the consequences of, a severe accident, or to maintain the integrity of the containment"		X The objective of the safety systems is to limit the radiological consequences for the public and the environment to the extent that no off-site protective actions are necessary.		This text is related to design basis accidents, therefore in compliance with para. 5.24 and 5.25 of SSR-2/1 (Rev.1) as part of Requirement 19.
Germany	4	3.13 Line 9	… The objective of the safety systems is to limit the radiological consequences for the public and the environment to the extent that no additional safety features or off-site protective actions are necessary ~~for the protection of the public.~~	Protection of both - the public and environment – is required. We suggest to delete the part of the sentence as redundant.	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
UK	7	3.14	Change 1st sentence: "Design basis accidents originate from postulated…." Change 2nd sentence: "….initiating events that are failed…"	Typographical errors		X 1st sentence as: 3.14 Design basis accidents are originated from ~~by~~ postulated initiating events that are not expected to occur during the lifetime of the plant. 3rd sentence (2nd sentence not applicable to comment) Design basis accidents should include both, infrequent and limiting faults ~~rare~~ as single initiating events ~~and frequent single initiating events~~ due to failure of the first and ~~that failed to be controlled at~~ the second levels of defence in depth.		The terms "infrequent and limiting faults" were added to be consistent with Table II-1 of Annex II of SSG-2 (Rev.1) referenced in para. 3.27 of that safety guide.
UK	8	3.14	Change 5th sentence to: "Safety systems designed to control design basis accidents should preferably rely on automatic actuation and should avoid the need for short term operator actions."	SSR 2/1 5.75 does not explicitly require automatic actuation and no operator intervention.		X Safety systems designed to control design basis accidents should rely on automatic actuation and ~~should avoid~~ the need for short term operator actions should be minimized		However, para. 4.11 (d) of Requirement 7 requires the automatic actuation of safety systems as well as in para. 5.11 of Requirement 16. Modification provided to be consistent with previous paras.

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
France	3	3.14	Design basis accidents should include both ~~rare~~ single initiating events due to failure of the first and ~~frequent single initiating events that failed to be controlled at~~ the second levels of defence in depth.	The initial proposal is misleading: SSG-2 also use the word “frequent” for some DBA, so it is not consistent to say that DBA are whether “rare” whether “frequent + something not frequent”. Moreover, level 2 detailed definition is quite tricky and the guidance should be careful with this level which is out of its scope. Eventually, the deleted part of the sentence could be understood as part of DEC.		X Design basis accidents should include both infrequent and limiting faults ~~rare~~ as single initiating events ~~and frequent single initiating events~~ due to failure of the first and ~~that failed to be controlled at~~ the second levels of defence in depth.		The terms “infrequent and limiting faults” were added to be consistent with Table II-1 of Annex II of SSG-2 (Rev.1) referenced in para. 3.27 of that safety guide.

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Canada	6	3.14 1st two sentences	*3.14 ~~Design basis accidents~~ Accident conditions are originated by postulated initiating events that are not expected to occur during the lifetime of the plant. The most frequent accidents are categorized as design basis accidents and should have an expected frequency typically below 10^{-2} per reactor-year.*	Text seems to have words missing. Also, specifying an upper frequency without a lower frequency includes DEC as well as DBA. SSG-2 Rev. 1 Annex 2 provides an example of the DBA frequency range down to 10^{-6}/y. An alternative range can be found in USNRC's Licensing Modernization Project as documented in NEI 18-04 which sets a lower frequency bound of 10^{-4}/reactor-year. Our suggested text does not include a frequency range. If one is thought necessary, NEI 18-04 is perhaps to be preferred because a full safety justification is provided.	X			

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Canada	7	3.14 3rd sentence	Delete the sentence or write it clearly and in accordance with SSR-2/1 and SSG-2.	The text is very unclear It places undue emphasis on single initiating events. It is not clear if the "frequent single initiating events" are in the AOO range or are at the high frequency end of the DBA range. SSR-2/1 Requirement 13 specifies frequency rather than number of failures as the basis for categorization of plant states. Limiting DBAs to single initiating events excludes potential multiple failures such as common-cause events (e.g. from fire or seismic).		X Design basis accidents should include both, infrequent and limiting faults as single initiating events due to failure of the first and the second levels of defence in depth.		To be consistent with SSG-2 Rev. 1 Annex 2.
Canada	8	3.14 4th sentence	Rewrite or delete.	The sentence puts things backwards. The text appears to suggest that safety systems are designed first and then initiating events are identified that challenge them.		X The safety systems should be designed to mitigate all the set of postulated initiating events considered for design basis accidents as challenges to the fulfilment of the safety functions or challenges to the barriers.		Correction is provided based on other comment.

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Canada	9	3.14 5th sentence	Rewrite to comply with SSR-2/1 pars 5.11.	Automatic actuation of safety systems is only necessary for DBAs that need it. See SSR-2/1 para 5.11.		X Safety systems designed to control design basis accidents requiring a prompt and reliable action should rely on automatic actuation and should avoid the need for short term operator actions should be minimized.		To be in compliance with para 5.11 of SSR-2/1 (Rev.1)
Canada	10	3.14 6th sentence	*Safety systems should be designed, and constructed as well as and maintained to ensure sufficient reliability.*	Rewrite for clarity.	X			
Canada	11	3.14 7th sentence	*Safety design concepts, such as conservative safety margins and redundancy, are required to should be applied in their design and construction. , and the The environmental conditions considered in their qualification programme should correspond to the loads and adverse environmental conditions induced by design basis accidents, postulated internal and external hazards.*	Rewrite as two sentences for clarity. Also, if using "are required", then a reference to a requirement (presumably in SSR-2/1) should be made.	X			
ENISS	2	3.14	3.14 Design basis accidents originated by postulated initiating events that are not expected to occur during the lifetime of the plant	Editorial		X Accidents conditions are originated from postulated initiating events that are not expected to occur during the lifetime of the plant.		Based on other MS comments.
ENISS	3	3.14	3.14 The majority of Design basis accidents originated by postulated initiating events that are not expected to occur during the lifetime of the plant.	There are some PIEs such as loss of offsite power that result in an immediate activation of protection rather than an AOO.		X Accidents conditions are originated from postulated initiating events that are not expected to occur during the lifetime of the plant.		The modification eliminates the need for adding the proposed text.

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
ENISS	4	3.14	~~The set of postulated initiating events considered for design basis accidents should cover all challenges to the safety functions and barriers with which the safety systems are designed to cope.~~ The safety systems should be designed to mitigate all the set of postulated initiating events considered for design basis accidents as challenges to the fulfilment of the safety functions or challenges to the barriers.	It seems strange to challenge the safety functions and barriers for which safety systems have been designed with the consideration of the SFC. This should typically be part of the DEC to consider the possible failure of safety systems. Consider revision. See suggestion in red	X			
Germany	5	3.14 Line 3	… Design basis accidents should include both, rare single initiating events and frequent single initiating events that failed to be controlled at the second level of defence in depth.	Punctuation	X			

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Canada	12	3.17 **Major Comment**	Suggest adding a footnote that some member states do not set different requirements for DEC-A and DEC-B, instead using SSR-2/1 paras 5.31 and 5.31A as written.	Canada has serious concerns with the creation of two plant states for DEC. The approach appears to be based on knowing, *a priori*, which events <u>should</u> be DEC-A. Such an approach may be effective for designs that are small variants of well understood earlier designs but will be difficult to apply to novel designs and will not adapt to SMRs. The approach seems to be based on Approach 1 to Levels of DiD shown in DS508 Table 1. This approach is likely too deeply rooted in some Member States to expect it to be significantly altered. However, DS508 must support Table 1 Approach 2. Splitting DEC into DEC-A and DEC-B must be presented as <u>optional</u> (as is done in SSG-2, para 7.46.		X Footnote: The definition of design extension conditions is provided in SSR-2/1 (Rev.1) Definitions section.		This safety guide does not create two separate new plant states but confirm what is presented in the definitions of the SSR-2/1 (Rev.1) which provides the explanation of what is mean buy design extension conditions. A footnote is added to link to the definition section of SSR-2/1 (Rev.1).

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Canada	13	3.17 Footnote 11	Delete the footnote. Verify that this reasoning is not used elsewhere in DS508.	The footnote is incorrect. “DEC without significant fuel degradation” applies to fuel in spent fuel storage as well as fuel in the core. “DEC with core melting” applies specifically to the core as large or early releases from sent fuel storage must be ‘practically eliminated’ and are therefore not part of DEC. See SSR-2/1 para 6.68 and DS508 para 3.29.		X Footnote modified as: The term ‘design extension conditions without significant fuel degradation’ comprises situations to be analysed for the fuel in the reactor core and the fuel in the spent fuel pool.		To be consistent with the situations to be considered as part of the design extension conditions without significant fuel degradation, SSR-2/1 (Rev.1) 6.44A.
UK	9	3.19	Change second sentence to read: “….mitigated by available safety systems provided these have not been….”	Improvement to wording	X			
France	4	3.19	In other States, design extension conditions without significant fuel degradation are postulated for complex sequences involving multiple failures, whereas very low frequency postulated single initiating events are treated as design basis accidents	Only single initiating event are treated as DBA	X			

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Canada	14	3.19 1st and 2nd sentence	*In general, the mitigation of design extension conditions ~~without significant fuel degradation~~ should be accomplished by safety features specifically designed and qualified for such conditions. Alternatively, design extension conditions ~~without significant fuel degradation~~ can be mitigated by available safety systems that have not been affected by the events that led to the design extension conditions under consideration and that are capable and qualified to operate under the associated environmental conditions.*	SSR-2/1 does not include separated requirements for DEC-A and DEC-B. This text applies to all DEC. See SSR-2/1 para 5.27.			X	Para. 4.13A of , SSR-2/1 (Rev.1) requires the independence between safety features for design extension conditions, especially those with core melting, and safety systems
Canada	15	3.19 3rd sentence	*A difference between design basis accidents and design extension conditions without significant fuel degradation is established in ~~some States~~ SSR-2/1 Requirement 13 and paragraph 5.1 in terms of their frequencies of occurrence.*	This is probably true for all Member States. It is established by SSR-2/1 Requirement 13 and para 5.1. A correction is suggested but deletion of the sentence would be better.		X A difference between design basis accidents and design extension conditions without significant fuel degradation is established based on their frequencies of occurrence (see Requirement 13 of SSR 2/1 (Rev.1) [1]).		The reference to the SSR-2/1 (Rev.1) is provided for consistency.

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Canada	16	3.19 4th sentence to the end of para. **Major Comment**	Canada suggests that this paragraph is deleted or completely rewritten.	This text is very unclear and probably wrong. Very low frequency events are only treated as DEC-A if they do not have significant fuel degradation. Very low frequency events with core melting are classified as DEC-B. How this is known at the time of classification is mystery. In Canada, we do not count number of failures and apply one set of rules to a single failure event and a different set of rules to a multiple failure (or complex) event of the same assessed frequency. It would be inconsistent. We do not apply DBA analysis rules to very low frequency events (DEC frequency range) except in exceptional circumstance, e.g. significant uncertainty or large contribution to risk.		X …In some States very low frequency initiating events are treated as design extension conditions without significant fuel degradation. In other States, design extension conditions without significant fuel degradation are postulated for complex sequences involving multiple failures, whereas very low frequency postulated single initiating events are treated as design basis accidents.		The changes proposed intends to clarify the information providing the possible application in different Member States

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ENISS	5	3.19	A difference between design basis accidents and design extension conditions without significant fuel degradation is established in some States in terms of their frequencies of occurrence. Very low frequency initiating events are treated as design extension conditions without significant fuel degradation. In other States, design extension conditions without significant fuel degradation are postulated for complex sequences involving multiple failures, whereas very low frequency postulated single initiating events are treated as design basis accidents.	Editorial. This text is more related to the identification of DEC-A. Suggest to move it to 3.18 with the addition of "single" for clarity.	X			
Japan	4	3.19.	In general, the ~~mitigation~~ control of design extension conditions without significant fuel degradation should be accomplished by safety features specifically designed and qualified for such conditions. Alternatively, design extension conditions without significant fuel degradation can be mitigated by available safety systems that have not been affected by the events that led to the design extension conditions under consideration and that are capable and qualified to operate under the associated environmental conditions. ……	To keep a consistency with table 1.	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Canada	17	3.20	Replace paragraph with: *The safety analyses of design basis accidents and design extension conditions without significant fuel degradation share similar safety objectives, namely, providing protection of the public at a level appropriate to the frequency of the accidents. See SSR-2/1 para 5.25 for design basis accidents and para 5.31A for design extension conditions*.	SSR-2/1 top level safety requirements for DBA and DEC are based on protection of the public. While they are different, they have more similarity than the low-level objectives listed. They are also more generally applicable than objectives based on an assumption of fuel type.		3.20 The safety analyses of design basis accidents and design extension conditions without significant fuel degradation may share similar safety objectives…	X	The objectives as provided in the proposed text are for the design and different in 5.25 (requires no off-site protective actions (DBA)) and 5.31A (requires limited protective actions (mainly for DEC-B)). The para 3.20 is related to safety analyses then reference to paras of SSG-2 (Rev.1) are more appropriate. However, "may" was added to allow different practices among Member States
Canada	18	3.21	Suggest restructuring document so that requirements common to DEC-A and DEC-B are presented first. This can be followed by specific section for DEC-A and DEC-B if any specific requirements remain.	Everywhere in this paragraph, "*DEC without significant fuel degradation*" could be changed to "*DEC*" and still remain consistent with SSR-2/1. Almost all this content will need to be repeated for DEC-B.			X	The structure of the section was agreed on previous meetings. The recommendations in para 3.21 are not all applicable to DEC with core melting such as no application of SFC while for DEC without significant fuel degradation SFC is applied at the function level .

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Canada	19	3.21 item (c) **Major comment**	*(c) The acceptance criteria related to the radiological consequences for design extension conditions are stated in paragraphs 5.31 and 5.31A of SSR-2/1 (Rev. 1) [1].* *Member States may choose to apply more restrictive acceptance criteria for design extension conditions without significant fuel degradation. For example, some Member States choose to apply identical or similar limits for radiological consequences to those for design basis accidents (see paras 7.32 to 7.33 and 7.46 of SSG-2 (Rev. 1) [9])*	This omits the SSR-2/1 requirements for radiological consequences, namely paras 5.31 and 5.31A. Member States may apply more restrictive limits to a subset of DEC if they choose. Provide the requirement first and the option after.		X (c) The requirements for the overall acceptable limits or criteria related to the radiological consequences for design extension conditions are presented in paras 5.31 and 5.31A of SSR-2/1 (Rev.1) [1]. However, Member States may choose to apply more restrictive acceptable limits or criteria for design extension conditions without significant fuel degradation. For example, some Member States choose to apply identical or similar acceptable limits or criteria for radiological consequences to those for design basis accidents (see paras 7.32 to 7.33 and 7.46 of SSG-2 (Rev. 1) [9]).		
ENISS	6	3.21a	Less stringent design requirements than for design basis accidents might be applied: for example, safety features for design extension conditions without significant fuel degradation may be assigned to a lower safety class than safety systems; ~~the single failure criterion is applied at the function level (i.e. functional redundancy) but is not applied at the system level (i.e. no redundancy among systems is applied);~~	This is too much to ask for a systematic application of the single failure criterion, even at a functional level.		X the single failure criterion may be applied at the function level where appropriate (i.e. functional redundancy) but may not be applied at the system level (i.e. no redundancy among systems is applied).		Modification proposed to allow a more flexible application.

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ENISS	7	3.21a	~~and supporting systems (e.g. cooling system) and I&C systems (e.g. the signal for anticipated transients without scram) may be more diversified than supporting systems and I&C systems used for design basis accidents;~~ The equipment of the safety features and their supporting systems (e.g. cooling system) including I&C systems (e.g. the signal for anticipated transients without scram) are diversified as far as necessary from the design basis accidents safety system when some equipment of these systems may be subjected to a common cause failure in the condition;(e.g. ATWS, SBO).	Diversification is a way to be protected against common cause failures, that are the heart of DEC-A conditions. Only requiring diversification on "support system" is not appropriate. Having a diversified I&C signal is useless if the acting component is not diversified and may have failed due to a common cause failure. ATWS are in that perspective of 2 types : ATWS on protection system common cause failure requiring diversified I&C signals and ATWS on reactor trip actuators, requiring diverse acting means. See proposed revision.		X The equipment of the safety features and their supporting systems (e.g. cooling system) including I&C systems (e.g. the signal for anticipated transients without scram) are diversified as far as necessary from the design basis accidents safety system when some equipment of these systems may be affected by a common cause failure in the accident condition (e.g. the anticipated transients without scram, the station blackout);		Accepted, but terminology modified.
Canada	20	3.22 2nd sentence	Delete the text in brackets in second sentence.	The text in brackets is incorrect. DBA accident scenarios are different to DEC scenarios. If the scenarios were the same, they would have the same frequency and be analysed as required for the applicable plant state.		X The deterministic safety analysis may use less conservative methods and assumptions than for design basis accidents (~~otherwise there would be no differentiation between design basis accidents and design extension conditions without significant fuel degradation~~ see 3.21).		Text deleted but reference to para 3.21 added.

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Canada	21	3.22 last sentence	*Nevertheless, there should still be ~~high~~ adequate confidence in the results of the safety analysis and the safety margins to avoid cliff edge effects should be demonstrated to be adequate (see paras 7.45 and 7.54 to 7.55 of SSG-2 (Rev. 1) [9]).*	SSG-2 paras 7.54 and 7.55 do not support the need for high confidence. This is clearly presented as an option. SSG-2 para 7.45 makes it clear that "adequate" confidence is acceptable.	X			
UK	10	3.23	Change first two sentences: "Design basis accidents are required to be analysed in a conservative manner: see para. 5.29 of SSR-2/1 (Rev. 1) [1]. However, design extension conditions without significant fuel degradation have the potential to exceed the capabilities of safety systems established for design basis accidents."	Swap first two sentence to improve understanding.	X			
Germany	6	3.23 Line 4	… ~~Therefore, for design extension conditions without significant fuel degradation it might be possible to show that some safety systems, with an extended capability embedded in their design, would be capable of, and be qualified for, mitigating the conditions under consideration, based on best estimate analyses and on less conservative assumptions than the assumptions used for design basis accidents.~~ Therefore it might be sufficient to show that some safety systems would be capable of, and be qualified for, mitigating the design extension conditions without significant fuel degradation based on best estimate analyses and on less conservative assumptions than the assumptions used for design basis accidents.	Restructuring and simplifying the sentence could make the main aspect clearer.		X Therefore, ~~for design extension conditions without significant fuel degradation~~ it might be possible to show that some safety systems, with an extended capability ~~embedded~~ in their design, would be capable of, and be qualified for, mitigating the design extension conditions without significant fuel degradation~~conditions under consideration,~~ based on best estimate analyses and on less conservative assumptions than the assumptions used for design basis accidents.		The "extended capability of safety systems" needs to be considered to be in accordance with SSR-2/1 (Rev.1) Requirement 20.

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France	5	3.25	n many plant designs, such conditions include anticipated transient without scram and station blackout, i~~.e. loss of the preferred power supply concurrent with a turbine trip and unavailability of all standby AC power supplies~~ (see 5.8 of SSG-34 [7]).	The sentence was not consistent with SSG-34 due to incomplete quotation. SBO is more complex that this sentence which would required unlimited number of AC alternate back-up. Another possibility to solve France concern is to fully quote SSG-34	X			
Canada	22	3.25	Add footnote: *Note that station blackout does not include loss of a suitably designed alternate AC power source. See para 5.8 of SSG-34 [7].*	Use of the Station Blackout as an example requires further explanation. It is often assumed to be loss of all AC electrical power, but this is incorrect. Uninterruptible AC power and alternate AC power are assumed to remain available.			X	The text was deleted and reference to para 5.8 of SSG-34 was added, where the definition of station blackout is made.

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ENISS	8	3.25	station blackout, ~~i.e. loss of the preferred power supply concurrent with a turbine trip and unavailability of all standby AC power supplies~~. i.e. loss of the off-site power concurrent with a turbine trip (failure of house-load mode) and unavailability (common cause failure) of all main emergency diesel.	With the provision of dedicated diesel to the SBO situation, it's now necessary to make a clear distinction between main diesel and additional diesels for SBO. The total loss of AC power is now either excluded, or to be studied as part the post-Fukushima enhancement with the provision of external diesels. See suggestion of wording.			X	The text was deleted and reference to para 5.8 of SSG-34 was added, where the definition of station blackout is made.

Canada	23	3.26 and 3.27 **Major Comment**	Provide an alternative to splitting DEC into DEC-A and DEC-B to avoid circular reasoning. Not all Member States use DEC-A and DEC-B or Approach 1 from DS508 Table 1. Repeat the technical objectives for DEC from SSR-2/1 para 5.27, either prevent core melting or mitigate the release. Obviously prevention is preferred, but splitting DEC in this way requires prior knowledge of which accident sequences should be DEC-A and which should be DEC-B.	These paragraphs demonstrate the circular reasoning arising from using the result of safety analysis (no significant fuel degradation) as an input to the safety analysis (the plant state). If a sequence (before performing the analysis) is allocated to DEC-A, then, if fuel damage is predicted, the design must be strengthened to prevent the fuel damage. In the absence of fuel damage, the result is acceptable. If the same sequence had been allocated to DEC-B, the significant fuel degradation would be accepted and focus would shift to the containment. If early or large release was predicted to occur, then the design must be strengthened to prevent the large release. Otherwise, the result is acceptable. Here we have two different outcomes for the same event sequence depending on the initial guess of the plant state, (DEC-A or DEC-B), to which the event sequence was allocated.		X 3.26 On the basis of engineering judgement and of deterministic and probabilistic safety assessments, ~~D~~design extension conditions without significant fuel degradation should also be considered to identify safety provisions to be implemented to prevent and reduce the frequency of… 3.27 …Therefore, the reliability of safety systems and safety features for design extension conditions without significant fuel degradation should be sufficiently high to prevent a severe accident by making the ~~that~~ escalation to a severe accident ~~is~~ very unlikely to occur.		The paras were modified to consider the inputs needed to reinforce the prevention of severe accidents since one objective of the NPP design should be to avoid having severe accidents with a high frequency, which is a role to the design safety features for design extension conditions without significant fuel degradation in compliance with Req. 20 SSR-2/1 (Rev.1).
UK	11	3.29	Should be referring to Section 4 (not 5)	Typographical error	X			

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France	6	3.30	All relevant accident conditions that could lead to core damage should be postulated as design extension conditions, even though the design provisions taken in accordance with the requirements of SSR-2/1 (Rev. 1) [1] to prevent such accidents will make the probability of core damage very low	this recommendation is not consistent with SSR-2/1: some accident condition that could lead to core damage are practically eliminated, thus are not postulated		X Relevant ~~All~~ accident conditions that could lead to core damage should be postulated as design extension conditions (see para 3.46 and 3.47 of SSG-2 (Rev.1) [9] and para 2.11 of SSG-53 [6]) , even though…		References to relevant paras was added.
Canada	24	3.30 1st sentence	Remove reference to SSG-53.	The postulated initiating events in para 3.8 of SSG-53 do not include core melt sequences caused by sequences such as loss of heat-sink or station blackout. The reference to SSG-2 is correct.			X	The list of accident conditions to be considered for the design of the reactor containment and associated systems is not reduce to para 3.8. Several paragraphs provide recommendations on the accident conditions to be considered for their design, for example para 3.38 does include the DEC mentioned and others.
ENISS	9	3.30	Relevant ~~All~~ accident conditions that could lead to core damage should be postulated as design extension conditions, even though the design provisions taken in accordance with the requirements of SSR-2/1 (Rev. 1) [1] to prevent such accidents will make the probability of core damage very low.	With the term "All" The statement is a bit strong, asking for any extremely low frequency core damage condition to be studied. This is not consistent with 3.29, stating ", a set of representative accident conditions with core melting should be postulated " Consider revision as suggested.		X Relevant ~~All~~ accident conditions that could lead to core damage should be postulated as design extension conditions (see para 3.46 and 3.47 of SSG-2 (Rev.1) [9] and para 2.11 of SSG-53 [6]) , even though…		References to relevant paras was added.

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UK	12	3.32	Change to read: "…. considered in establishing accident management procedures and guidelines."	Improvement to wording	X			

UK	13	3.33	Change 1st two sentences as follows: "Radioactive releases from the containment in a severe accident should remain below acceptable limits for design extension conditions. Furthermore, there should be sufficient time for implementation of off-site protective actions and releases that do occur should be limited such that any off-site protective actions would be sufficient for the protection of people and of the environment."	The references to "safety limit" in this paragraph are unclear. This paragraph is referring to a "safety limit' for radioactive release which is below any acceptable limits relevant to DEC – this 'safety limit' is not defined or mentioned prior to this point. The quote from SSG-53 specifically refers to a "safety limit leak rate" but presumably this is not the same as the safety limit (or acceptable limit) for radioactive release in 3.33 ? The Glossary defines 'acceptable limit' as ".. a limit on the predicted radiological consequences of an accident…" – this is not the same as a containment leak rate. Re-wording proposed to simplify this paragraph (OK to retain rest of paragraph).		X 3.33 The source term inside the containment in a severe accident conditions is such that the radioactive releases from any direct leakage to the environment have to be avoided or minimised. If the reactor containment integrity is intact, the direct radioactive releases are a consequence of the reactor containment leak rate, depending on the reactor containment pressure. Specific measures may be considered. Firstly, the potential for direct radioactive releases from leakages should be minimised by providing a reactor containment leak rate safety limit, as stated in para 4.100 of SSG-53 [6]: "At the design stage, a target leak rate should be set that is well below the safety limit leak rate (i.e. well below the leak rate assumed in the assessment of possible radioactive releases arising from accident conditions)". Moreover, additional potential paths of leakage of radioactive releases (e.g. containment penetrations) may be identified and measures need to be taken to avoid and reduce the impact of those radioactive releases to the environment (e.g. collect and filter such leakages). Secondly as the actual reactor containment leak rate increases by a higher reactor containment pressure , this pressure should be controlled. This may be		The difference between the safety limit leak rate and the acceptable limits needs to be mentioned (see Req. 55 of SSR-2/1 (Rev.1)). The paragraph has been modified to try to eliminate the confusion at this point. A footnote was added to make reference to the glossary term "acceptable limit" The para 3.33 has been modified based on other comments

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						achieved by ensuring and maintaining adequate cooling of the reactor containment atmosphere during the severe accident or by a filtered reactor containment venting system allowing to reduce the radioactive releases. Therefore, unfiltered direct radioactive releases from the reactor containment in a severe accident should remain below the reactor containment leak rate safety limit to allow sufficient time for implementation of off-site protective actions. Beyond this time, releases might exceed the reactor containment leak rate safety limit but should still be well below the acceptable limits for design extension conditions requiring the implementation of off-site protective actions in place. Those radioactive releases should also be well below what is considered as a large radioactive release.		

France	7	3.33	Radioactive releases from the containment in a severe accident should remain below the… …i.e. well below the leak rate assumed in the assessment of possible radioactive releases arising from accident conditions)". ~~This may be achieved by provision of adequate filtered containment venting or other design features or alternative measures.~~	There is no link between the deleted sentence and the quotation: low leak rate is not achieved with a filtered venting		X 3.33 The source term inside the containment in a severe accident conditions is such that the radioactive releases from any direct leakage to the environment have to be avoided or minimised. If the reactor containment integrity is intact, the direct radioactive releases are a consequence of the reactor containment leak rate, depending on the reactor containment pressure. Specific measures may be considered. Firstly, the potential for direct radioactive releases from leakages should be minimised by providing a reactor containment leak rate safety limit, as stated in para 4.100 of SSG-53 [6]: "At the design stage, a target leak rate should be set that is well below the safety limit leak rate (i.e. well below the leak rate assumed in the assessment of possible radioactive releases arising from accident conditions)". Moreover, additional potential paths of leakage of radioactive releases (e.g. containment penetrations) may be identified and measures need to be taken to avoid and reduce the impact of those radioactive releases to the environment (e.g. collect and filter such leakages). Secondly as the actual reactor containment leak rate increases by a higher reactor containment pressure , this pressure should be controlled. This may be achieved by ensuring and maintaining adequate cooling of the reactor containment atmosphere during the severe accident or by a filtered reactor containment venting system allowing to reduce the		The difference between the safety limit leak rate and the acceptable limits needs to be mentioned, which are different (see Req. 55 of SSR-2/1 (Rev.1)). The paragraph has been modified considering other recommendations to try to eliminate the confusion at this point. A footnote was added to make reference to the glossary term "acceptable limit"

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						radioactive releases. Therefore, unfiltered direct radioactive releases from the reactor containment in a severe accident should remain below the reactor containment leak rate safety limit to allow sufficient time for implementation of off-site protective actions. Beyond this time, releases might exceed the reactor containment leak rate safety limit but should still be well below the acceptable limits for design extension conditions requiring the implementation of off-site protective actions in place. Those radioactive releases should also be well below what is considered as a large radioactive release.		

Canada	25	3.33 **Major comment**	*3.33 As required by SSR-2/1 Rev. 1 [1], radioactive releases from the containment in a severe accident should ~~remain below the safety limit to~~ allow sufficient time for implementation of off-site protective actions. Beyond this time, ~~releases might exceed the safety limit but should still be well below the acceptable limits for design extension conditions with off-site protective actions in place.~~ radioactive releases should ~~also~~ be ~~well~~ below what is considered a large radioactive release. ~~Moreover, as stated in para 4.100 of SSG-53 [6]:~~ ~~"At the design stage, a target leak rate should be set that is well below the safety limit leak rate (i.e. well below the leak rate assumed in the assessment of possible radioactive releases arising from accident conditions)".~~ ~~This may be achieved by provision of adequate filtered containment venting or other design features or alternative measures.~~*	This paragraph attempts to set new limits "well below" the actual limits. This is not acceptable. The limits for radioactive releases are given in SSR-2/1 para 5.31 and that early radioactive releases and large radioactive releases are practically eliminated. The paragraph appears to misinterpret the target and safety limit leak rates from SSG-53 which are about leakage rates, not about radioactive releases. The text from SSG-53 is not relevant in this paragraph.		X The source term inside the containment in a severe accident conditions is such that the radioactive releases from any direct leakage to the environment have to be avoided or minimised. If the reactor containment integrity is intact, the direct radioactive releases are a consequence of the reactor containment leak rate, depending on the reactor containment pressure. Specific measures may be considered. Firstly, the potential for direct radioactive releases from leakages should be minimised by providing a reactor containment leak rate safety limit, as stated in para 4.100 of SSG-53 [6]: "At the design stage, a target leak rate should be set that is well below the safety limit leak rate (i.e. well below the leak rate assumed in the assessment of possible radioactive releases arising from accident conditions)". Moreover, additional potential paths of leakage of radioactive releases (e.g. containment penetrations) may be identified and measures need to be taken to avoid and reduce the impact of those radioactive releases to the environment (e.g. collect and filter such leakages). Secondly as the actual reactor containment leak rate increases by a higher reactor containment pressure , this pressure should be controlled. This may be achieved by ensuring and maintaining adequate cooling of the reactor containment atmosphere during the severe accident or by a filtered reactor containment venting system allowing to reduce the		There is no intention to set new limits. The difference between the safety limit leak rate and the acceptable limits needs to be mentioned, which are different (see Req. 55 of SSR-2/1 (Rev.1)). The paragraph has been modified considering other recommendations to try to eliminate the confusion at this point. A footnote was added to make reference to the glossary term "acceptable limit"

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						radioactive releases. Therefore, unfiltered direct radioactive releases from the reactor containment in a severe accident should remain below the reactor containment leak rate safety limit to allow sufficient time for implementation of off-site protective actions. Beyond this time, releases might exceed the reactor containment leak rate safety limit but should still be well below the acceptable limits for design extension conditions requiring the implementation of off-site protective actions in place. Those radioactive releases should also be well below what is considered as a large radioactive release.		

ENISS	10	3.33	Radioactive releases from the containment in a severe accident should remain below the safety limit to ow sufficient time for implementation of off-site protective actions. Beyond this time, releases might exceed the safety limit but should still be well below the acceptable limits for design extension conditions with off-site protective actions in place. Radioactive releases should also be well below what is considered a large radioactive release. The source term inside the containment in a severe accident conditions is such than the releases from any direct leakage to the environment have to be avoided or minimised. The leakages are a direct consequence of the containment leak rate, dependent on the containment pressure. Specific measures may be considered. Firstly, the potential for leakages should be minimised ~~Moreover~~, as stated in para 4.100 of SSG-53 [6]: "At the design stage, a target leak rate should be set that is well below the safety limit leak rate (i.e. well below the leak rate assumed in the assessment of possible radioactive releases arising from accident conditions)". In addition, the potential sources of leak (e.g. containment penetration) may be identified and measures taken to reduce the potential of a direct leakage to the environment (e.g. collect and filter such leakages). Secondly, as the actual leak rate is increased by a higher containment pressure[a], this pressure should be controlled. This may be achieved by the provision of adequate cooling of the containment atmosphere or by the provision of a filtered containment venting ~~or other design features or alternative measures~~.	This paragraph is very confusing. It is not clear what it is trying to establish. It talks about controlling leak rates but then cites FVC as a means of achieving this when this is deliberately increasing the leak rate, increasing the release magnitude, but keeping it below some radioactive release "safety limit". The containment leak rate for a given containment pressure is an assumption for releases calculation in AOO/DBA/DEC. It may cover direct leak to the environment as well as indirect leak (through adjacent building) that may be collected and filtered by HVAC systems. It's not something specific to DEC-B. What is specific to DEC-B is the large source term. A filtered containment venting is somehow an intentional leakage to the environment but controlled and filtered to reduce the actual releases to the environment. The text is mixing releases and indirect means to reduce the		X The source term inside the containment in a severe accident conditions is such that the radioactive releases from any direct leakage to the environment have to be avoided or minimised. If the reactor containment integrity is intact, the direct radioactive releases are a consequence of the reactor containment leak rate, depending on the reactor containment pressure. Specific measures may be considered. Firstly, the potential for direct radioactive releases from leakages should be minimised by providing a reactor containment leak rate safety limit, as stated in para 4.100 of SSG-53 [6]: "At the design stage, a target leak rate should be set that is well below the safety limit leak rate (i.e. well below the leak rate assumed in the assessment of possible radioactive releases arising from accident conditions)". Moreover, additional potential paths of leakage of radioactive releases (e.g. containment penetrations) may be identified and measures need to be taken to avoid and reduce the impact of those radioactive releases to the environment (e.g. collect and filter such leakages). Secondly as the actual reactor containment leak rate increases by a higher reactor containment pressure , this pressure should be controlled. This may be achieved by ensuring and maintaining adequate cooling of the reactor containment atmosphere during the severe accident or by a filtered reactor containment venting system allowing to reduce the		Modified to be consistent with the terminology.

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			[a] : At some point the pressure may be so high that the containment may start to fail. This is a cliff edge effect to be avoided.	releases in an unclear manner. See suggestion for clarification.		radioactive releases. Therefore, unfiltered direct radioactive releases from the reactor containment in a severe accident should remain below the reactor containment leak rate safety limit to allow sufficient time for implementation of off-site protective actions. Beyond this time, releases might exceed the reactor containment leak rate safety limit but should still be well below the acceptable limits for design extension conditions requiring the implementation of off-site protective actions in place. Those radioactive releases should also be well below what is considered as a large radioactive release.		

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Japan	5	3.33.	Radioactive releases from the containment in a severe accident should remain below the safety limit to allow sufficient time for implementation of off-site protective actions. Beyond this time, releases might exceed the safety this limit but should still be well below the acceptable limits for design extension conditions limit with off-site protective actions in place. Radioactive releases should also and be well below what is considered a large radioactive release. Moreover, as stated in para 4.100 of according to SSG-53 [6]:	Clarification for meaning of "well below".			X	The term "well below" here is intended to precise the difference or gap considered in the design between the safety limit or criteria related to the allowed containment leak rate of radioactive release and the leak rate of radioactive release for which off—site protection actions for the public and the operators need to be taken. Since reference to para. 4.100 of SSG-53 is provided, it was not considered the need to add a footnote. The para 3.33 was modified considering other comments.
Canada	26	3.34	Delete paragraph.	This paragraph is simply a repetition of SSG-53 and adds nothing.			X	This paragraph supports para 3.33.

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Canada	27	3.36 to 3.54	Delete the section. This content belongs in a separate safety guide covering all levels of DiD from all perspectives.	The section on assessment of the implementation of defence in depth does not belong in a document on DEC and Practical Elimination. The section is limited to a subset of DiD topics, e.g. para 3.36 limits discussion to "*the safety provisions for each level are adequately designed to meet the objectives of that level in terms of prevention, detection, limitation and mitigation*." This excludes many relevant topics such as management system, staff training, operating procedures, maintenance, testing inspection and repair. Level 5 DiD is not even touched on. Similarly, paragraph 3.38 limits discussion to design and analysis for mitigation of postulated initiating events, leaving out level 1 DiD almost entirely. Detailed comments are not provided.			X	However, if all NUSSC Members agree with your proposal, this text should be used for the DS536.

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Germany	7	3.38	The performance and reliability of safety provisions for all plant states (including technical and organizational measures) should be assessed, taking into consideration an applicable set of analysis rules, the level of risk and the safety significance of the safety provisions. …	Adding a common definition of “provisions” should prevent misinterpretations.	X			The footnote 4 was added as: “Design safety provisions” is considered in this safety guide as the design solutions applied to structures, systems and components to ensure their required level of safety.
UK	14	3.41	Change 1st sentence to read: “… some levels of defence in depth may not be appropriate…”	Improvement to wording	X			
Ukraine	2	3.42	… For each identified source of radiation, the physical barriers ~~(including the reactor coolant pressure boundary and the containment boundary)~~ should be identified and their robustness should be evaluated in accordance with a graded approach	The boundaries specified in the brackets are inapplicable to some of the radiation sources listed in para. 3.40 (e.g., fresh fuel, irradiated fuel and fuel casks).		X For each identified source of radiation, the physical barriers (including for the reactor core, the reactor coolant pressure boundary and the containment boundary) should be identified and their robustness should be evaluated in accordance with a graded approach.		To ensure that the robustness of these barriers will be also evaluated.
Japan	6	3.49.	The reliability of structures, systems and components for controlling anticipated operational occurrences should be such that they are capable of reducing the number of challenges to safety systems and of contributing to preventing the occurrence of design base accidents and design extension conditions.	Controlling AOO will contribute to prevent the occurrence not only of DEC but also DBA.		X …of challenges to safety systems and of contributing to preventing the occurrence of ~~design base accidents and~~ ~~design extension~~ accident conditions.		The term “accident conditions” encompasses both DBA and DEC.
UK	15	3.50	Change first sentence to: “….does not exceed any safety goals of the plant where set ….”	As written, this seems to be implying that a CDF should be set, which may not be the case.	X			

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
UK	16	3.52	"The reliability of safety features for design extension conditions without significant fuel degradation should be such that it can be demonstrated, with a sufficient level of confidence and considering applicable analysis rules (see paras 7.45-7.55 of SSG-2 (Rev. 1) [9]), that the core damage frequency is lower than the established probabilistic targets.	Improvement to wording – the current wording is open for interpretation. Is it saying "core damage with a frequency higher than established targets should be prevented [by operation of reliable features]" or "reliability of safety features should ensure the core damage frequency is lower than the established targets"? It has to be read very carefully currently to get the correct meaning.	X			
UK	17	3.54	Change to: "It should be demonstrated that the reliability of safety systems and safety features for design extension conditions has taken into account the reliability of their supporting systems."	Improvement to wording – the reliability of safety systems may in fact be limited by that of support systems.	X			
UK	18	3.58	Change first sentence to: "Because of these factors, full independence of the levels of defence in depth may be difficult to achieve".	Improvement to wording	X			
France	8	3.59	As emphasized in para. 4.13A of SSR/2-1 (Rev. 1) [1], safety features for design extension conditions (especially features for mitigating the consequences of accidents involving the melting of fuel) shall as far as is practicable be independent of safety systems. ~~this is especially important when safety systems are to be credited for the mitigation of design extension conditions (see para. 3.65).~~	To be consistent with SSR-2/1 – 4.13A. Another solution to solve France concern is to delete the sentence because 4.13A do not support the first one	X			

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
ENISS	12	3.59/3.60	3.59 […] For example, it is a common practice to use some safety systems for certain anticipated operational occurrences. For example, the intervention of the protection system might be necessary to shut down the reactor for some anticipated operational occurrences that cannot be controlled by the limitation system. For most reactor designs, the reactor trip system is a safety system that is also needed for the control of some anticipated operational occurrences. 3.60 When an equipment A is used for a plant state and equipment B used for another plant state, equipment A and B should be isolated from one another. However, practical limitations of design necessitate exemptions to such isolation, each of which should be justified.	Suggestion of change		X 3.59 As far as practicable, the sharing of safety systems or parts of them for executing safety related functions for different plant states should be avoided. However, since this might not be always practical or possible, it should be ensured that within the event sequence that might follow a postulated initiating event, a safety system credited to respond in a given plant state will not have been needed for a preceding plant state. As emphasized in para. 4.13A of SSR/2-1 (Rev. 1) [1]: "… safety features for design extension conditions (especially features for mitigating the consequences of accidents involving the melting of fuel) shall as far as is practicable be independent of safety systems." Therefore, in some reactor designs it is a common practice to allow the use of some safety systems for certain anticipated operational occurrences. For example, the intervention of the reactor protection system might be necessary to shutdown the reactor for some anticipated operational occurrences that cannot be controlled by the limitation system. For most reactor designs, the reactor trip system is a safety system that is also needed for the control of some anticipated operational occurrences.		To take account of terminology

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
UK	19	3.60	Second sentence: "However, practical limitations of design may in certain situations necessitate exemptions to such functional isolation, although each case should be justified."	Improvement to wording – exemptions may not be required in all cases. As worded, it suggests that this might be the normal (which it shouldn't be).	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
ENISS	11	3.60	~~The systems needed for different plant states should be functionally isolated from one another in such a way that a malfunction or failure in any plant state does not propagate to another. However, practical limitations of design necessitate exemptions to such functional isolation, each of which should be justified. Thus, it is a common practice to use some safety systems for certain anticipated operational occurrences. For example, the intervention of the protection system might be necessary to shut down the reactor for some anticipated operational occurrences that cannot be controlled by the limitation system. For most reactor designs, the reactor trip system is a safety system that is also needed for the control of some anticipated operational occurrences. In such cases, it should be shown that there is no practicable alternative to use of the safety system to cope with the anticipated operational occurrence, and that the use of the safety system for such an occurrence does not present a significant limitation on the use of the safety system to mitigate a design basis accident.~~	We aree not sure that this statement is relevant. Firstly, the vocabulary used is not clear enough: what does "system" means here: normal operation system, safety system, safety feature for DEC? The reactor coolant system is used in almost all plant sates. Do you mean that this has to be justified ? The provision of such justification is not really adding value for safety, just paperwork. The statement is redundant with para 3.59. The document recognises that the reactor trip by the protection system is used in AOO/DBA and may even be used in DEC. This is a practical example of 3.59. Suggestion is to keep the reactor trip example as part of 3.59 and add a clearer statement for 2 equipment part of 2 plant states. See suggestion below		X 3.60 The systems needed for different plant states should be functionally isolated from one another in such a way that a malfunction or failure in a system in a given plant state does not propagate affecting another system required in the following plant state. However, practical limitations of the reactor design may in certain situations necessitate exemptions to such functional isolation, although each case should be justified.		To take account of terminology

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Japan	7	3.60.	The systems needed for different plant states should be functionally isolated from one another in such a way that a malfunction or failure in any plant state does not propagate to another. However, practical limitations of design necessitate exemptions to such functional isolation, each of which should be justified. Thus, it is a common practice to use some safety systems for certain anticipated operational occurrences. For example, the intervention of the protection system might be necessary to shut down the reactor for some anticipated operational occurrences ~~that cannot be controlled by the limitation system.~~	"limiting system is specific for a certain type of an NPP, and it is not suitable to specify this system as an example. In addition, there is no definition in the glossary.	X			
Canada	28	3.62 to 3.66	Delete the section. This content belongs in a separate safety guide covering all levels of DiD from all perspectives.	The section on assessment of independence of the levels of DiD is again limited and does not belong in a document dedicated to Level 4 DiD. As described in para 3.62, the assessment is limited to design and analysis and only addresses plant equipment. Detailed comments are not provided.			X	However, if all NUSSC Members agree with your proposal, this text should be used for the DS536.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Germany	8	3.63 Last sentence	Such common cause failure might have originated in the layout, design, manufacture, operation or maintenance~~, In addition, functional dependence between structures, systems and components should be removed or justified~~. If a functional dependency between structures, systems and components has not been removed, this must be justified in the assessment.	The last part of this sentence needs to be restructured.	X			
ENISS	13	3.66	~~In particular, the necessary safety features for design extension conditions for core melting should always remain available.~~ In particular, a common cause failure should not affect at the same time the safety functions performed by the safety systems or some safety features for DEC without significant fuel degradation and the safety functions of the necessary safety features for design extension conditions for core melting.	This statement is too strong. An internal hazard or an aircraft crash only affecting the DEC-B safety features may be acceptable, while this statement would mean this is not acceptable and redundant DEC-B features have to be implemented. Consider revision as suggested	X			However, the text in this section is proposed to be deleted since it is out of the scope of the safety guide.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Japan	8	3.66.	An assessment shold be conducted of the independence of structures, systems and components that might be necessary at different levels of defence in depth to mitigate the consequences of a single hazard or a likely combination of internal or external hazards on the plant. It should be demonstrated that the postulated initiating event and the failures induced in the plant cannot result in common cause failure of the structures, systems and components necessary for mitigation of consequence of the hazard at different levels of defence in depth.	The target of mitigation is not hazard itself but should be the consequence of the hazard.	X			
Canada	29	4.2	Suggest adding after the quote: “*This requirement is repeated in SSR-2/1 para 5.31*.”	The quoted requirement is repeated in SSR-2/1 para 5.31. It could be referenced here.	X			
USNRC	1	4.3 or 4.8	Add “Independent of the design or specific definitions of the phrases, early radioactive releases or large radioactive releases are those which could challenge defence in depth Level 5 provisions.”	Use of these terms, as noted in 4.8, may have State- or design-specific connotations (see: containment function).	X			Added as 2nd sentence of 4.8
UK	20	4.6	Change second half of the 1st sentence to read: “….rather, the application of practical elimination may lead to the identification of additional safety provisions which will compliment defence in depth in the design.”	To avoid a suggestion that there are features for DEC and then additional features for practical elimination – the message should be that all provisions contribute to demonstrating defence in depth (consistent with the wording in 4.9 and the text in footnote 13).	X			

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UK	21	4.6	Change last sentence to read: "….an early release or a large release…."	For consistency with the definition of practical elimination and other usage in the text.	X			
Russian Federation	1	4.7	This para was excluded			X		Original para. 4.7 is considered in the new version of the safety guide as para. 4.8.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
UK	22	4.7	Delete paragraph 4.7	The first sentence is essentially a repeat of the first sentence of 4.4. The rest of 4.7 is confusing – it talks about other 'technical means' (relating to accident management) which are not part of a demonstration of practical elimination. It is not clear what these technical means might be or why they might not be part of a demonstration of practical elimination.			X	This paragraph intends to clarify that purpose of applying the concept of practical elimination. This is not covered by para. 4.4. A modification is proposed to avoid confusion as: 4.7 Therefore, as mentioned in para. 4.4, the concept of practical elimination should be applied only in relation to plant event sequences that could lead to an early radioactive release or a large radioactive release, for which reasonably practicable technical means for their mitigation cannot be implemented. Otherwise, the technical means should be considered in the design ~~accordance with the strategy~~ for the ~~accident~~ mitigation of the accident consequences at the plant, but . ~~T~~this would not constitute the application of the concept of practical elimination.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
ENISS	14	4.7	~~The concept of practical elimination should be applied only in relation to plant event sequences that could lead to an early radioactive release or a large radioactive release, for which reasonably practicable technical means for their mitigation cannot be implemented. Otherwise, technical means should be considered in accordance with the strategy for accident mitigation at the plant. This would not constitute application of the concept of practical elimination.~~	The meaning of this paragraph is not clear and the issue being addressed after “otherwise” has already been covered by para 4.6. Suggestion is to remove this paragraph as being a duplication of the same idea.		X 4.7 Therefore, as mentioned in para. 4.4, the concept of practical elimination should be applied only in relation to plant event sequences that could lead to an early radioactive release or a large radioactive release, for which reasonably practicable technical means for their mitigation cannot be implemented. Otherwise, the technical means should be considered in the design for the mitigation of the accident consequences at the plant, but this would not constitute the application of the concept of practical elimination.		There is a need to provide recommendation to clarify the difference to consider in the design the safety provisions for DEC and those used to justify the practical elimination concept. Para modified to improve clarity.
European Commission	2	4.8	Include reference values that could be used to determine which accident sequences have to be practically eliminated because they would lead to a large release.	Although reference values for early releases have to be site-specific, for large releases it should be possible for these reference values to be agreed. Not including them is a missed opportunity to harmonize the implementation of the "practical elimination" concept.			X	IAEA Safety Guides avoid providing specific figures related quantitative acceptance limits or criteria for the radiological consequences of accident conditions since this is on the responsibility of national authorities. The Safety Guide on Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants, currently under review, will propose recommendations those probabilistic safety goals.

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Canada	30	4.8 last sentence	Delete final sentence.	This is an unjustified addition to the SSR-2/1 requirement. The description of practical elimination in the footnotes of SSR-2/1 has alternative options with no preference stated: • deterministic (<u>*physically impossible*</u> *for the conditions to arise*) probabilistic (*high level of confidence to be* <u>*extremely unlikely*</u> *to arise*)		4.8…However, the justification that a plant event sequence has been practically eliminated should rely primarily on a deterministic evaluation of the robustness and independence of design safety provisions and should not solely relied on the compliance with such probabilistic criteria, but supported by the results of probabilistic safety assessments.	X	The footnote in SSR-2/1 (Rev.1) does not differentiate between deterministic and probabilistic methods since "impossibility" can't be attached solely to deterministic or "high level of confidence" to probabilistic. The recommendation aims at clarifying that given the level of uncertainties, the compliance with the practical elimination concept should not rely primarily only on meeting the probabilistic safety criteria, but supported by it. The sentence has been modified to provide a clear recommendation.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
USNRC	2	4.8/8	Modify (underlined): "However, the justification that a plant event sequence has been practically eliminated should rely primarily on a deterministic evaluation of the design functions and should ~~not be solely demonstrated by demonstrating compliance with such~~ be supported by probabilistic criteria as appropriate."	This is inconsistent with 4.36 and the use of this concept in many member states; further, whether an evaluation is a deterministic or probabilistic one can be left to interpretation in some cases for highly reliable or otherwise passive components.		X However, the justification that a plant event sequence has been practically eliminated should rely primarily on a deterministic evaluation of the robustness and independence of design safety provisions and should not ~~be~~ solely ~~demonstrated~~ relied ~~by demonstrating~~on the compliance with such probabilistic criteria, but supported by the results of probabilistic safety assessments.		It is not the functions, but the robustness and the independence of those SSCs considered for the justification of that a plant event sequence is practically eliminated. In addition, the second part is to recommend that given the level of uncertainties related to the phenomena during the severe accident progression the justification of the application that a plant event sequence has been practically eliminated should not be only on meeting a probabilistic criteria.
Germany	9	4.11	In a severe accident, large quantities of radioactive substances are likely to be present and not confined in the fuel or by the reactor coolant system. In addition, severe accident phenomena ~~that~~ can generate large amounts of energy very rapidly.	Clarification.	X			
Ukraine	3	4.11	… In addition, severe accident phenomena ~~that~~ can generate large amounts of energy very rapidly.	Editorial	X			
Canada	31	4.11 last sentence	*Together, this can make it impossible to ensure the ~~containment integrity~~ confinement of radioactive material, thus giving rise to unacceptable radiological consequences.*	Practical elimination applies also to early or large release from spent fuel storage. Modify text to cover spent fuel storage.	X			

Canada	32	4.12 last sentence **Major Comment**	Delete final sentence or revise it to agree with the requirements of SSR-2/1 as explained in the "reason" column: *Therefore, the issue when considering whether a particular plant event sequence should be practically eliminated is the potential for the event sequence to lead to a ~~failure of the confinement function~~ release greater than the maximum release permitted in DEC. See SSR-2/1 Rev. 1, para 5.31A.*	The conclusion in the final sentence does not follow. The event sequences discussed above do not "lead to a failure of the confinement function". They are cases where the confinement function was not available. The maximum release permitted in DEC is set in SSR-2/1 para 31A. *5.31A. The design shall be such that for design extension conditions, protective actions that are limited in terms of lengths of time and areas of application shall be sufficient for the protection of the public, and sufficient time shall be available to take such measures.* A release for which protective actions are not limited in lengths of time and areas of application is a large release. A release where the is insufficient time available to take protective action is an early release (SSR-2/1 footnote 3). SSR-2/1 para 5.31 requires that a large or early release must be practically eliminated. Therefore, any release more severe than that		X Therefore, the issue when considering whether a particular plant event sequence should be practically eliminated is the potential for the event sequence to lead to ~~a failure of the confinement function~~radioactive release greater than the maximum radioactive release allowed in accordance with requirement for design extension conditions in para 5.31A of SSR-2/1 (Rev.1) [1].		Text modified to be consistent with terminology.

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
				permitted in DEC must be practically eliminated.				
Germany	10	4.13	…. (c) Plant event sequences that could lead to late containment failure, such as: (i) Basemat penetration or containment bypass during molten corium concrete interaction; (ii) Long term loss of containment heat removal~~;~~. ~~(iii) Explosion of combustible gases, including hydrogen and carbon monoxide.~~	Listing the explosion of combustible gases is redundant since it already must be considered for plant event sequences that could lead to early containment failure (the potentially more severe types of plant event sequences) and a double naming could lead to confusion.			X	The sources of combustible gases generation are different in the early phase (zircaloy oxidation, steel oxidation, etc. during core dewatering, reflooding and quenching) than in the late phase (core melt formation and relocation, chemical reactions of reactor materials in the melted pool, core concrete interactions, etc.) of core degradation during the severe accident progression.
Germany	11	4.13	(i) Basemat penetration or ~~containment bypass~~ other damage to the containment integrity during molten corium concrete interaction;	The term “containment bypass” is misleading as the event sequences involving a containment bypass are listed separately and require a separate safety demonstration (as stated in para I-35).	X			

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Japan	9	4.13(c)	(c) Plant event sequences that could lead to late containment failure, such as: (i) Basemat penetration or containment bypass during molten corium concrete interaction; (ii) Long term loss of containment heat removal (e.g. residual heat removal failure); (iii) Loss of containment cooling against overtemperature (e.g. containment spray failure); (ivii) Explosion of combustible gases, including hydrogen and carbon monoxide.	Loss of containment cooling or external spraying of metallic containments might lead to late containment failure due to overtemperature.		X (ii) Long term loss of containment heat removal (e.g., failure of containment heat removal system); (iii) Loss of containment cooling against overtemperature (e.g. failure of containment spray system);		To be in agreement with the terms used in the IAEA safety guide SSG-53.
USNRC	3	4.13/4	"As an example (see 4.15), the following five general types of plant event sequences should be considered, depending on their applicability for specific designs:"	Phrasing in examples is LWR specific and could lead non-LWR designers to believe no accident sequences are applicable.	X			
Finland	1	4.14	The grouping in para. 4.13 is consistent with the recommendations provided in SSG-53 [6] and SSG-2 (Rev. 1) [9], and highlights some examples of plant event sequences (e.g. severe accident conditions) for consideration for practical elimination.	typo please check the referenced paragraph 4.14 should be 4.13	X			
Germany	12	4.14	The grouping in para. ~~4.14~~ 4.13 is consistent with the recommendations provided in SSG-53 [6] and SSG-2 (Rev. 1) [9], and highlights some examples of plant event sequences (e.g. severe accident conditions) for consideration for practical elimination.	Mistake in reference. The same for paras 4.15, 4.16 (a), 4.28, 4.30. Please change 4.14 into 4.13.	X			
Ukraine	4	4.14	The grouping in para. ~~4.14~~ 4.13 is consistent with the recommendations …	Editorial	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Canada	33	4.14, 15, 16, 28, 30 Editorial	Correct text to reference 4.13. Check other cross references that may have become misaligned, e.g. para 4.16 refers to itself.	The text makes many references to para 4.14. The references should all be to para 4.13.	X			
USNRC	5	4.14/1	Typo: should 4.14 here instead reference 4.13?	4.14 appears to be referencing 4.13 grouping	X			
European Commission	3	4.14/4.15/4.16	*The grouping in para.* ***4.13*** *is consistent ...* *The consequences of the accidents in para.* ***4.13****(c)(i) and* ***4.13****(c)(ii) could in fact be ...* *The identification and grouping described in paras* ***4.13*** *and* ***4.15*** *should combine ...*	The cross-references seem to be wrong	X			
Finland	2	4.15	Other criteria for grouping are also possible. The consequences of the accidents in para. 4.1<u>3</u>(c)(i) and 4.1<u>3</u>(c)(ii) could in fact be mitigated by the implementation of reasonable technical means. In such cases, for scenarios not retained within the scope of consideration for practical elimination, evidence of the effectiveness and an appropriate reliability of the mitigation should be provided. To facilitate the grouping proposed, each type of plant event sequence should be analysed to identify the associated combination of failures or associated physical phenomena that are specific to the plant design, and which have the potential to lead to a loss of the confinement function.	typo please check the referenced paragraph 4.14 should be 4.13	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
UK	23	4.15	Delete the second and third sentences	The purpose and meaning of these two sentences is not clear in the context of the rest of this paragraph (which is on grouping of sequences). For example, the third sentence seems to be at odds with other parts of Section 4, e.g. the first part of 4.6 and 4.9. These sentences could be removed without affecting the meaning of the wider Section 4.	X			
France	9	4.15		The comment does not aim at modifying the article, it is just a reminder that this article is of high importance for France and shall not be deleted	X			
Canada	34	4.15 last sentence	*To facilitate the grouping proposed, each type of plant event sequence should be analysed to identify the associated combination of failures or associated physical phenomena that are specific to the plant design, and which have the potential to lead to a ~~loss of the confinement function~~ release greater than the maximum release permitted in DEC.*	As for the comment above on para 4.12, it is not the loss of confinement function that must be practically eliminated. It is a release greater that permitted in the DEC plant state. A loss of the containment function alone is not a problem if the fuel is intact and cooled.		X To facilitate the grouping proposed, … and which have the potential to lead to a ~~loss of the confinement function~~radioactive release greater than the maximum radioactive release allowed in accordance with para 5.31A of SSR-2/1 (Rev.1) [1].		Text modified to be consistent with terminology.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Finland	3	4.16	The identification and grouping described in paras 4.13 and 4.15 should combine, when relevant, the following approaches: (a) A phenomenological (top-down) approach, in which phenomena are considered that might challenge the confinement function before or in the course of a severe accident, in order to define a comprehensive list of plant event sequences, i.e. as listed in para. 4.13;	typo, please check the referenced paragraphs 4.14 should be 4.13 and 4.16 should be 4.15	X			
Germany	13	4.16	The identification and grouping described in paras ~~4.14~~ 4.13 and ~~4.16~~ 4.15 should combine, when relevant, the following approaches:	We guess here is mistake in reference as well – 4.16 should be 4.15.	X			
Russian Federation	2	4.16, foot note 5	If the spent pool located inside the containment (as in WWER design) the degradation of the spent fuel does not result in a early or large release, thus there is no clear need to consider this accident for practical elimination.	This text is suggested to be added because the original text does not addresses the design where spent pool located inside containment		X Footnote 17 is modified as: … Therefore, any plant event sequence with significant degradation of the fuel assemblies stored in the spent fuel pool located outside of the containment has to be considered for practical elimination. If the spent pool is located inside the containment (as in WWER designs) the degradation of the spent fuel does not result in an early radioactive release or large radioactive release. Thus, for those particular designs, the plant event sequence with significant degradation of the fuel assemblies stored in the spent fuel pool might not be needed to be considered for practical elimination.		
USNRC	4	4.16/1	Typo: should 4.16 here instead be 4.15?	Reference to self (rather than 4.15) seems inaccurate	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Ukraine	5	4.16b	… A sequence-oriented (bottom-up) approach, in which all plant event sequences that could lead to a severe accident are reviewed	Editorial	X			
Canada	35	4.19	Simplify the text to describe the requirements for the final design and safety demonstration and remove the description of a process to be followed.	The text describes the design process. This is not a licensed activity and does not pose a risk of a release of radioactivity. What is required in a final design is a completed design with a safety demonstration that shows that the requirements of SSR-2/1 are met. There appears to be little value in describing a process to be used by the design authority to achieve the end result.		X 4.19 ~~Following the identification of relevant event sequences, and grouping them into a smaller set of plant conditions, as the next step, the designer should undertake an~~ The assessment aimed at identifying safety provisions in the form of design and operational features that could be implemented for demonstrating the practical elimination of each relevant plant event sequence should considered. In this assessment, the following aspects ~~should be considered~~:		To provide clear recommendation
USNRC	6	4.19	(a) The state of the art in nuclear science and technology, as appropriate.	Major comment: There should be a qualifier because the phrase "state-of-the-art" for methods, techniques, or technologies is not clearly defined and in some instances may have yet to be appropriately vetted, adequately peer reviewed or have consensus for use in a particular application.	X			

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Country	Com ment No.	Para/Line No.	Proposed new text	Reason	Accept ed	Accepted, but modified as follows	Rejec ted	Reason for modification/rejection
Finland	4	4.20	The identification of safety provisions necessitates a comprehensive analysis of the physical phenomena involved and it might be necessary to further refine the identification of event sequences performed in accordance with the approaches described in para. 4.16.	typo please check the referenced paragraph 4.17 should be 4.16	X			
Germany	14	4.20	The identification of safety provisions necessitates a comprehensive analysis of the physical phenomena involved and it might be necessary to further refine the identification of event sequences performed in accordance with the approaches described in para. ~~4.17~~4.16.	Here reference to para. 4.17 should be changed to 4.16.	X			
Canada	36	4.20	No suggestion. Intent of paragraph was not understood.	This paragraph is not clear. What is a “comprehensive analysis of the physical phenomena involved”. Also, check cross reference to 4.17.		X 4.20 The identification of safety provisions necessitates a comprehensive analysis of the physical phenomena involved, from the deterministic, probabilistic and engineering judgement perspectives, and it might be necessary to further refine the identification of event sequences performed in accordance with the approaches described in para. 4.1~~7~~6.		The assessment of the appropriate and sufficiency of the design safety provisions should consider deterministic, probabilistic and engineering judgement.
Finland	5	4.21	The designer should establish a decision making process for determining reasonably practicable safety provisions to achieve practical elimination. Several options for safety provisions should be developed ~~and submitted to the decision-making process~~.	Clarity, Please delete ~~and submitted to the decision-making process~~. It is not needed and it is not clear to whose decision-making process the designer will submit the information.		X … Several options for safety provisions should be ~~developed~~ considered and the rational for selecting the final design of safety provisions should be documented		Consideration of proposal of other Member State

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Ukraine	6	4.21	Several options for safety provisions should be ~~developed and submitted to the decision making process~~ considered and the rational for selecting the final design of safety provisions should be documented	Submission of design options for the decision making assumes early regulatory involvement into the design assessment, which is not strictly required in the Member States	X			
UK	24	4.22	2nd sentence is too long and should be split	To improve readability	X	It should be verified that the appropriate engineering design rules, such as (e.g., fail safe actuation and protection against common cause failures induced by internal and external hazards)~~;~~ and technical requirements for the safety provisions in that level of defence in depth or plant state have been followed.~~,~~ The aim of this verification is to ensure that…		
Germany	15	4.22 Line 4	… It should be verified that the appropriate engineering design rules, such as fail safe actuation and protection against common cause failures induced by internal and external hazards; and technical requirements for the safety provisions in that level of defence in depth or plant state have been followed, to ensure that the safety provisions would achieve their safety function with sufficient margins to account for uncertainties, under the prevailing conditions, e.g. the harsh ~~environmental~~ operating conditions associated with a severe accident.	The term "environmental conditions" is often associated with the off-plant conditions resulting from external hazards. The term "operating conditions" might be more appropriate.			X	The term "harsh environmental conditions" is an accepted term to describe the ambient conditions (e.g., temperature, pressure, humidity percentage, radiation doses, etc.) for which equipment will be required to perform their intended functions associate to an accident condition. (See IAEA Safety Guide SSG-69 on Equipment qualification for nuclear installations)

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Germany	16	4.23	(b) The environment for performing the action (e.g. access to the local area, components to be handled, identification of the location of components, ambient conditions). If local actions are expected to be taken in harsh ~~environmental~~ working conditions, this is likely to reduce the necessary reliability for demonstration of practical elimination.	The term “environmental conditions” might be misleading, we suggest to change.			X	The term “harsh environmental conditions” is an accepted term to describe the ambient conditions (e.g., temperature, pressure, humidity percentage, radiation doses, etc.) for which equipment will be required to perform their intended functions associate to an accident condition. (See IAEA Safety Guide SSG-69 on Equipment qualification for nuclear installations)
European Commission	4	4.23	Move paragraph to section titled "Practical elimination of event sequences considered, with a high level of confidence, to be extremely unlikely to arise"	Operator actions can be considered only when the demonstration of practical elimination is based on "extreme unlikeliness with a high degree of confidence".			X	The recommendation sin this para could be used in either of the two sections. It was selected to have it here since this para gives recommendations related to safety provisions in particular when operator actions are relevant. The general demonstration of the application of the practical elimination is conducted in the following sections.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
European Commission	5	4.23	*... high pressure core melt conditions).* ***Operator actions should be minimised and, when unavoidable,*** *a human factor assessment should be part of the justification supporting any claim for their high reliability.*	Human actions should not be the preferred option to justify practical elimination		X ~~In such cases~~Requiring operator actions should be minimized and, when unavoidable, a human factor assessment should be part of the justification supporting any claim for high reliability of operator actions.		
European Commission	6	4.23	*(a) The availability of information given to operating personnel to perform the actions from the control room or locally, the quality of the procedures or guidelines to implement the actions,* ***and the training of the required operating personnel***	The quality of training impacts the assessment of the human factor	X			
Canada	37	4.23 item (b)	*If local actions are expected to be taken in harsh environmental conditions, this is likely to reduce the ~~necessary~~ reliability for demonstration of practical elimination.*	The "necessary reliability" is the target reliability that must be achieved. This is not reduced. It is the actual reliability achieved in harsh conditions that is likely to be reduced.	X			
Canada	38	4.25	Consider referencing an alternative paragraph from SSR-2/1.	Para 5.21A of SSR-2/1 is from a section applying to external hazards. A better reference may be SSR-2/1 para 5.15A which includes internal and external hazards. Unfortunately, 5.15A does not specifically mention prevention of early or large release.			X	The purpose of this para is to provide a recommendation related to the need to consider margins in the design of safety provisions required for large or early radioactive release with regard to the impact of internal and external hazards as stated in para 5.21A. Para 5.15A is generally applicable to all items important to safety.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Canada	39	4.26	*4.26 Where safety provisions for demonstrating practical elimination rely on support functions, the relevant supporting systems should all be designed to the standards necessary to ensure that they have same level of overall reliability as the safety provisions. The design should use a combination of redundancy, separation, diversity, and robustness to hazards ~~as the safety provisions they support~~ to achieve the required reliability. Alternatively, ~~or that~~ the safety provisions ~~are~~ should be tolerant to the loss of support functions.*	The goal here is to ensure that support services have an overall reliability commensurate with the safety provision. Design for high reliability typically uses a mixture of redundancy, separation, diversity, and robustness. The text seems to imply that the support systems use <u>the same combination</u> of methods as the safety provision. This is not necessary. The text does not mention redundancy. See SSR-2/1 Requirement 24.		X …they have same level of overall reliability as the safety provisions. The design should use a combination of safety design principles such as redundancy, separation, diversity, and robustness to hazards ~~as the safety provisions they support~~, to achieve the required reliability of the relevant safety function. Alternatively, ~~or that~~ the safety provisions ~~are~~ should be tolerant to the loss of support functions.		Text modified to be consistent with terminology.
UK	25	4.27	Change to: "The overall effectiveness of the safety provisions identified by the designer to demonstrate practical elimination should be <u>proven</u> through a safety assessment….."	Alternative wording to remove use of 'demonstrate' twice.	X			
Finland	6	4.28	The safety provisions developed to prevent the event sequences in each of the groups in para. 4.1<u>3</u> from occurring should all be analysed. None of the phenomena or accident conditions indicated should be overlooked because of their low likelihood of occurrence. Credible research results should be employed to support claims of effectiveness of the safety provisions.	typo, please check the referenced paragraph 4.14 should be 4.13	X			
Ukraine	7	4.28	~~The~~ All safety provisions developed to prevent the event sequences in each of the groups in para. ~~4.14~~ 4.13 from occurring should ~~all~~ be analysed	Editorial	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Canada	40	4.28 to 4.30 Editorial	Check cross references.		X			
Germany	17	4.29 Line 2	Either it should be demonstrated that it is physically impossible for the event sequence to arise (see paras ~~4.34 and 4.35~~4.33 and 4.34) or it should be demonstrated, with a high level of confidence, that the event sequence is extremely unlikely to arise (see paras ~~4.36 to 4.43~~4.35 to 4.42).	Mistake in references to paras, please verify.	X			
Finland	7	4.30	As evident from para. 4.13, the various event sequences to be considered for practical elimination are inherently rather different. As a consequence, their practical elimination should be demonstrated on a case by case basis.	typo, please check the referenced paragraph 4.14 should be 4.13	X			
Ukraine	8	4.30	As evident from para. ~~4.14~~ 4.13, the various event sequences to be considered for practical elimination are inherently ~~rather~~ different.	Editorial	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Finland	8	4.34	In practice, the demonstration of physical impossibility is limited to very specific cases. Demonstration of physical impossibility cannot rely on measures that involve active components or operator actions. An example is the practical elimination of the effect of heterogeneous boron dilution, for which the main protection is provided first by injecting a limited volume of non-borated water which does not allow that effect to happen and second because of the negative reactivity coefficient for all possible combinations of the reactor power and coolant pressure and temperature. In this case, only a prompt reactivity insertion accident could be considered physically impossible.	This is not a good example of the practical elimination due to physically impossible. Please consider replacing boron dilution with some other examples. WENRA Report Practical Elimination Applied to New NPP Designs - Key Elements and Expectations, 2019 page 14 A) Complete absence of unacceptable loads by appropriate design features or measures B) Demonstration that the maximum load is significantly lower than the minimum resistance of relevant SSCs			X	There are several examples that could be presented related to the physical impossibility. The example here of the heterogenous boron dilution corresponds to case B in the WENRA Report, where the "maximum load" is the maximum volume of clean water that could be injected into the reactor coolant system without any unnoticed operation or human error and that could not lead to a potential power excursion, where the power excursion is understood as the "minimum resistance of relevant SSCs".

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Ukraine	9	4.34	An example is the practical elimination of the effect of heterogeneous boron dilution, for which the main protection is provided first by limiting ~~injecting~~ a ~~limited~~ volume of non-borated water injected which does not allow that effect to happen…	Editorial		X By design, the accident could be considered as eliminated by demonstrating that only a limited volume of non-borated water could be injected, which does not allow that effect to happen. The accident could be also considered as eliminated by demonstrating that sufficient negative reactivity coefficient exists for possible combinations of the reactor power and coolant pressure and temperature, for the core cycle. In this case, a prompt reactivity insertion accident could be considered physically impossible.		Modified based on other Member States comments

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
ENISS	15	4.34	4.34 In practice, the demonstration of physical impossibility is limited to very specific cases. Demonstration of physical impossibility cannot rely on measures that involve active components or operator actions. ~~An example is the practical elimination of the effect of heterogeneous boron dilution, for which the main protection is provided first by injecting a limited volume of non-borated water which does not allow that effect to happen and second because of the negative reactivity coefficient for all possible combinations of the reactor power and coolant pressure and temperature. In this case, only a prompt reactivity insertion accident could be considered physically impossible.~~ An example of its use may be for uncontrolled reactivity accidents for which the main protection is provided by ensuring a negative reactivity coefficient with all possible combinations of reactor power and coolant pressure and temperature.	The inclusion of the "first" item in the 3rd sentence raises the question of how this limitation is achieved since it usually involves administrative controls (i.e. operator action) and so cannot form part of a physically impossible argument. Why not use the wording of SSG-2 Rev 1 para 7.72?		4.34…An example is the practical elimination of the prompt reactivity accident from the effect of heterogeneous boron dilution. By design, the accident could be considered as eliminated ~~for which the main protection is provided first~~ by demonstrating that only a ~~injecting~~ limited~~a limited~~ volume of non-borated water could be injected, which does not allow that effect to happen. ~~and second~~The accident could be also considered as eliminated by demonstrating ~~because~~ that sufficient ~~of the~~ negative reactivity coefficient exists for ~~all~~ possible combinations of the reactor power and coolant pressure and temperature, for the core cycle. In this case, ~~only~~ a prompt reactivity insertion accident could be considered physically impossible. Another example is the practical elimination of containment failure from post-accident combustible gas (e.g., hydrogen) detonation. By design, excessive containment loads from the effects of gas detonation in the containment building could be considered as eliminated by justifying that a limited amount of material that could generate combustible gas during a severe accident exists. Then, the use of bounding analyses of the maximum gas generated justifying that combustible gas concentration is below the detonation limit could demonstrate physical impossibility.	X	The limitation in volume of non-borated water is not an administrative control, since the volume is physically fixed. The example as presented in SSG-2 (Rev.1) is also used. The para has been modified based on several comments to improve the clarification and provide another example.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
USNRC	7	4.34	"……An example is the practical elimination of prompt reactivity insertion accident from the effect of heterogeneous boron dilution., for which the main protection is provided first by injecting a . By design, the accident may be eliminated by limited limiting the volume of injectable non-borated water which does not allow that effect to happen and second . The accident may also be eliminated because sufficient negative reactivity coefficient exists for all possible combinations of the reactor power and coolant pressure and temperature, for the core cycle. In this case, only a prompt reactivity insertion accident could be considered physically impossible."	Major comment: Improve readability and clarity. The section could be read in an overly restrictive way as there are at least two approaches to achieve elimination. Reactivity coefficients are time/core cycle dependent (beginning, middle, end of cycle).		X By design, the accident could be considered as eliminated by demonstrating that only a limited volume of non-borated water could be injected, which does not allow that effect to happen. The accident could be also considered as eliminated by demonstrating that sufficient negative reactivity coefficient exists for possible combinations of the reactor power and coolant pressure and temperature, for the core cycle. In this case, a prompt reactivity insertion accident could be considered physically impossible.		It is important to emphasize the need for "demonstration" of the robustness of the design safety provisions considered.
USNRC	8	4.34	Add a second example: Another example is the practical elimination of containment failure from post-accident combustible gas (e.g., hydrogen) detonation. By design, excessive containment loads from the effects of gas detonation in the containment building may be eliminated by limiting the amount material that could generate combustible gas during a severe accident. Use of bounding analyses of the maximum gas generated demonstrating that combustible gas concentration is below the detonation limit could demonstrate physical impossibility.	It would be useful to have more than just one example of physical impossibility, in particular having an example of a scenario that challenges containment directly resulting in a large release. Advances in fuel materials (e.g., accident tolerant fuels) and/or selection of low combustible gas generating materials in the containment (from a core-concrete interaction aspect) are means to reduce concentration of combustible gas.		X Another example is the practical elimination of containment failure from post-accident combustible gas (e.g., hydrogen) detonation. By design, excessive containment loads from the effects of gas detonation in the containment building could be considered as eliminated by justifying that a limited amount of material that could generate combustible gas during a severe accident exists. Then, the use of bounding analyses of the maximum gas generated justifying that combustible gas concentration is below the detonation limit could demonstrate physical impossibility.		It is important to emphasize the need for "demonstration" of the robustness of the design safety provisions considered.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Germany	18	4.35	The demonstration that certain plant sequences are extremely unlikely to occur should rely on the assessment of engineering aspects, deterministic considerations, supported by probabilistic considerations to the extent possible, taking into account the uncertainties due to the limited knowledge of some physical phenomena. Although	Typo	X			
Ukraine	10	4.35	The demonstration that certain plant sequences are extremely unlikely to occur should…	Editorial	X			
UK	26	4.35	Change penultimate sentence to: "…is not a reason for discounting further consideration of means to protect the containment against the conditions generated by such an accident."	Improve wording (and remove double negative)	X			
Canada	41	4.35 last sentence	*In contrast, design extension conditions with core melting are required to be postulated in the design, in accordance with ~~Requirement 20~~ paragraph 5.30 of SSR-2/1 (Rev. 1) [1].*	Requirement 20 of SSR-2/1 does not specifically mention core melting. A better reference would be SSR-2/1 para 5.30.	X			
ENISS	16	4.35	The demonstration that certain plant sequences are extremely unlikely to occur should rely on the assessment of engineering aspects,		X			

European Commission	7	4.35 – 4.42	Modify the text to require the use of probabilistic analyses to supplement the deterministic assessment	In these paragraphs, the probabilistic analyses are considered as "complementary", suggesting that practical elimination based on "extremely unlikely to occur with high level of confidence" can generally be achieved with deterministic arguments alone. This is not well in line with other existing guidance. For instance, WENRA paper "Practical Elimination Applied to New NPP Designs - Key Elements and Expectations" requires probabilistic reasoning (based on a PSA model) in addition to deterministic analyses, and specifies attributes needed for the PSA model (although it recognises that in some cases the use of probabilistic arguments would not be meaningful for some countries). In general terms, it is difficult to see how you can prove that a sequence is "extremely unlikely" without using at least some sort of probabilistic analyses			X	The recommendations aim at defining that the justification that a plant event sequence has been considered as practically eliminated should not rely only on meeting probabilistic safety goals considering the uncertainties related to the limited knowledge of some physical phenomena. This approach is the same stated by the Technical Guidelines for the design and construction of the next generation of nuclear power plants with pressurized water reactors, where this concept was initially introduced. This approach constitutes a major difference with the approach proposed by the WENRA paper.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Germany	19	4.36	The demonstration that an event sequence can be practically eliminated should consider the following, as applicable: (a) An adequate set of safety provisions, including both equipment and organizational provisions; (b) The robustness of these safety provisions (e.g. adequate margins, adequate reliability, qualification for the operational conditions); (c) The independence between ~~these safety~~ <u>the stated equipment</u> provisions (i.e. an adequate combination of redundancy, physical separation, diversity and functional independence).	Since "independence" is not really applicable to organizational provisions, the objective can be changed to “equipment provisions”.		X (c) The independence between the stated equipment safety provisions (i.e. an adequate combination of redundancy, physical separation, diversity and functional independence).		Keep the word safety for consistency with (a).
Japan	10	4.38.	If probabilistic arguments are used to support a claim that a particular event sequence has been practically eliminated, it should be ensured that the cumulative contribution of all the different event sequences considered does not exceed the target frequency for early radioactive releases or large radioactive releases, ~~if such a target has been claimed by the designer or operating organization in the safety assessment of the plant or has been established by the regulatory body.~~	Complicated sentence because there are two “if” clauses so the last “if” clause should be deleted.		X ~~If~~When probabilistic arguments are used to support a claim that a particular event sequence has been practically eliminated, it should be ensured that the cumulative contribution of all the different event sequences considered does not exceed the target frequency for early radioactive releases or large radioactive releases, if such a target has been claimed by the designer or operating organization in the safety assessment of the plant or has been established by the regulatory body.		The second if specifies from where the frequency target comes from. It is important to keep that in the sentence for the overall understanding.
UK	27	4.39	Change to: “The validity of any probabilistic models used should be <u>confirmed for the intended application</u>.”	Improve wording	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Russian Federation	3	4.41	Hence, the occurrence of the single initiating event (i.e. failure of a large pressure retaining component) and the consequential uncontrolled radioactivity release should be considered practically eliminated.	Uncontrolled release of radioactivity is a dependent consequence of the initiating event and it is not reasonable to consider it as a separate event.			X	The text is the concluding recommendation of the paragraph where it implies that efforts should be put on both prevention (avoid the occurrence of the single initiating event) and mitigation (large radioactive release) for plant event sequences that could lead to large radioactive release. That is why the proposed text consider both events: …Hence, both the occurrence of the single initiating event (e.g. failure of a large pressure-retaining component) and the consequential event (i.e. uncontrolled reactivity accident) should be considered for practical elimination.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
UK	28	4.41	Change 1st sentence to read: "…may rely…."	Improve wording			X	The high level of confidence on those particular plant event sequences related to the catastrophic failure of large pressure-retaining component could only be achieved by adequate provisions defined the first and second levels of defence in depth, therefore, a strong "should" statement is considered, "may" is not strong enough.

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
UK	29	4.41	Delete last sentence	The purpose of this sentence (and the reference to uncontrolled reactivity accident) is unclear. It could be removed without changing the meaning of the rest of the paragraph.			X	The text is the concluding recommendation of the paragraph where it implies that efforts should be put on both prevention (avoid the occurrence of the single initiating event) and mitigation (large radioactive release) for plant event sequences that could lead to large radioactive release. That is why the proposed text consider both events: …Hence, both the occurrence of the single initiating event (e.g. failure of a large pressure-retaining component) and the consequential event (i.e. uncontrolled reactivity accident) should be considered for practical elimination.
Germany	20	4.41 Footnote 17	In some States, this demonstration is associated with other concepts such as ‘incredibility of failure’, ’break preclusion’, ‘high integrity component’, ‘non-breakable component’, rather than with the concept of practical elimination.	Proposal to add the German variation of the concept as well.	X			

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Country	Com ment No.	Para/Line No.	Proposed new text	Reason	Accept ed	Accepted, but modified as follows	Rejec ted	Reason for modification/rejection
Canada	42	4.42 1st sentence	*4.42 If the event sequence to be practically eliminated is the result of an event sequence in which the confinement function ~~degrades~~ is degraded before core melt occurs, then it should be demonstrated, with a high degree of confidence, that core melt will be prevented.*	Use of "degrades" implies that the degradation of the confinement function is lost during the event. This excludes pre-existing loss of the confinement function, e.g. open containment during outage.	X			
Canada	43	4.42 last sentence	*This means that, at least, the usual levels of defence in depth should be implemented (i.e. for anticipated operational occurrences, design basis accidents and design extension conditions without significant fuel degradation) with enhancements, as necessary, to prevent design extension conditions with core melt.*	The text should refer to "DEC without significant fuel degradation".	X			

France	10	5.x	Most of the articles of chapter 5 are not consistent with SSR-2/1 by recommending the use of non permanent equipment whilst SSR-2/1 requires to **enable** the use of them. Please check all the articles (for example 5.5 and bullet 2 of 5.7) and make them consistent with SSR-2/1: "levels of natural hazards exceeding those considered for design, derived from the hazard evaluation for the site"	Please be consistent with requirements of SSR-2/1 Moreover, France considers that this chapter is not satisfactory because it does not deal with the topic fully according to SSR-2/1. For SSR-2/1, the topic is a general enabling of use of non-permanent equipment which focus on some safety functions (or supports) and not on some level of hazards. France can live with this chapter but considers it should be read with precautions to ensure consistency with SSR-2/1.	X	Relevant paragraphs in section 5 were updated with the correct terminology as: "external hazards exceeding the levels considered for design"		Para. 5.3 reflects the focus of requiring non-permanent equipment in relation to restoring safety functions as in SSR-2/1 (Rev.1) while para. 5.5 provide example of use of non-permanent equipment as in para 3.89 of SSG-54. In addition, SSR-2/1 (Rev.1) requires "the design shall include features to enable the safe use of non-permanent equipment…" which implies that the NPP design needs to considered design features (e.g., multiple hook-up points, I&C for control & operation, radiological shielding) allowing (enabling) the connection (use) of non-permanent equipment. The link made in DS508 between the use of non-permanent equipment and the external hazards is related to the added paragraphs to ensure the safety functions considered in the revised version of SSR-2/1 (Rev.1) to take into consideration lessons from the

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
								Fukushima Daiichi nuclear accident. Agree that recommendation in this section should be read carefully with consistency with SSR-2/1 (Rev.1)
France	11	5.x	Most of the articles of chapter 5 are not consistent with SSR-2/1 by using wording like “external hazards exceeding those considered for design”. Please check all the articles and make them consistent with SSR-2/1 wording: “levels of natural hazards exceeding those considered for design, derived from the hazard evaluation for the site”	Please be consistent with requirements of SSR-2/1	X			It is considered equivalent phrases “external hazards exceeding the levels considered for design” and “levels of hazards exceeding those considered for design, derived from the hazard evaluation for the site”. The appropriate reference of SSR-2/1 (Rev.) is provided in paras. 5.1 to 5.3 for the reader and to avoid quotation of SSR-2/1 (Rev.1) in every paragraph.
Ukraine	11	5.1	… the design basis for items important to safety should ~~be~~ take into account the most limiting conditions… This is done ~~is~~ as a part of the site evaluation	Editorial	X			
UK	30	5.1	Change last sentence to: “This is done as part of….”	Typographical error	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Canada	44	5.1 2nd sentence to end.	*This includes the conditions resulting from internal and external ~~natural~~ hazards. In accordance with Requirement 17 of SSR-2/1 (Rev. 1) [1], the effects of internal and external hazards and relevant combinations of hazards are required to be evaluated. For external hazards this is done is as part of the site evaluation for the plant (see IAEA Safety Standards Series No. SSR-1. Site Evaluation for Nuclear Installations [16])*	SSR-2/1 requirements 14 and 17 both include internal hazards and are not limited to "natural" hazards. The reference to SSR-1 is limited to external hazards so the final sentence needs to recognise this.	X			
ENISS	17	5.1	As an application of Requirement 14 of SSR-2/1 (Rev. 1) [1], the design basis for items important to safety should ~~be~~ take into account the most limiting conditions		X			
ENISS	18	5.1	This is done ~~is~~ as part of the site evaluation for the plant (see IAEA Safety Standards Series No. SSR-1. Site Evaluation for Nuclear Installations [16]).		X			
Canada	45	5.2 1st sentence	Delete "natural".	Usually, same requirements apply to natural and human-induced external hazards. See SSR-1.	X			
Canada	46	5.3 1st sentence	*5.3 To provide resilience against ~~levels of external hazards~~ event sequences exceeding those considered for design, several requirements are established in SSR-2/1 (Rev. 1) [1] regarding the inclusion of features in the design to enable the safe use of non-permanent equipment for the following purposes:*	While external hazards may have been the primary concern leading to establishment of provisions for non-permanent equipment, their use is not limited to just event sequences caused by external hazards. DS508 should not limit the intent of SSR-2/1 in this way.		X 5.3 To provide resilience against ~~levels of external hazards~~ event sequences exceeding those considered for design, such as levels of natural external hazards exceeding those considered in the design basis, several requirements…		To be in compliance with para 5.21A of SSR-2/1 (Rev.1)

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
ENISS	19	5.3	In addition to these margins and to provide additional resilience against levels of external hazards exceeding those considered for design, several requirements are established in SSR-2/1 (Rev. 1) [1] regarding the inclusion of features in the design to enable the safe use of non-permanent equipment for the following purposes…	The position about the need for non-permanent equipment is not clearly expressed in SSR-2/1. But the need for margin is explicit in 5.21A and recalled in DS 508 5.2. If there is a clear requirement for margin AND for the use of non-permanent equipment, this should be said. See suggestion.		X 5.3 In addition to these margins and tTo provide additional resilience against ~~levels of external hazards~~ event sequences exceeding those considered for design, such as levels of external hazards exceeding those considered in the design basis, several requirements are established in SSR-2/1 (Rev. 1) [1] regarding the inclusion of features in the design to enable the safe use of non-permanent equipment for the following purposes :		To consider other comments
Canada	47	5.5 1st sentence	5.5 Non-permanent equipment is primarily intended for preventing unacceptable radioactive consequences in the long term phase of accident conditions and after very rare events (e.g. ~~natural~~ external hazards exceeding the levels considered for the design, derived from the hazard evaluation for the site) for which the capability and availability of design features installed onsite might be affected.	SSR-1 always specifies (with a few very specific exceptions) natural and human induced external hazards. SSR-2/1 is less consistent, but where only natural external hazards are specifically mentioned, human-induced external hazards should probably be included. Suggest that DS508 ensures that limitation to only natural hazards is not used (or only under very specific circumstances).	X			

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Japan	11	5.5.	Non-permanent equipment is primarily intended for preventing unacceptable radioactive consequences in the long term phase of accident conditions and after very rare events (e.g. natural external hazards exceeding the levels considered for the design, derived from the hazard evaluation for the site) for which the capability and availability of design features installed onsite might be affected [xx]. The aim of the use of non-permanent equipment is to restore safety functions that have been lost, but it should not be the regular means for coping in the short term phase for design basis accidents or for design extension conditions (see also paras 7.51 and 7.64 of SSG-2 (Rev. 1)). [XX] Details of non-permanent equipments handling are provided in SSG-54 [X].	Add in the footnote or reference here for SSG-54 "Accident Management Programmes for Nuclear Power Plants".		X Footnote considered as: Further considerations related to non-permanent equipment are provided in SSG-54 [15] 5.5 Non-permanent equipment is primarily intended for preventing unacceptable radioactive consequences in the long term phase of accident conditions and after very rare events (e.g. ~~natural~~ external hazards exceeding the levels considered for the design,…		Other modifications are related to other comments to be in compliance with para 5.21 of SSR-2/1 (Rev.1)

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Canada	48	5.6 5.8	Delete “natural”. (2 occurrences) Also 5.8 item (a)	See above.		X For natural external hazards, it is not always possible to get sufficient confidence in the frequency of occurrence of a certain level of hazard for the definition of a design basis level and furthermore for higher level. In that case, rather than trying to associate levels to frequencies, the level of natural hazards exceeding the level considered for design should be defined by the addition of a relevant margin. The behaviour of structures, systems and components to loading parameters resulting from these levels should be assessed.~~Particularly for external hazards, if the design basis for the plant is well established, it is expected that the frequency of occurrence of a natural hazard of a severity significantly exceeding the levels considered for design will be very low. However, as such frequencies are generally associated with significant uncertainties, the behaviour of structures, systems and components to loading parameters resulting from levels of external hazards exceeding those considered for the design should be well understood.~~		Text considering another comment. In this new text, the mention of natural external hazard is acceptable since it is an example.

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ENISS	20	5.6	To meet the SSR-2/1 requirements recalled ~~set out~~ in para. 5.2 and 5.3, levels of natural hazards exceeding those considered for design, i.e. those derived from the hazard evaluation for the site, should be considered and their consequences should be evaluated as part of the defence in depth approach.	This evaluation should not be limited to the purpose of non-permanent equipment, this is also a good way to identify the need for further margins. 5.3 of DS508 should not be defining new requirements, but guidance on the ones from SSR-2/1. This have to be clear in a guidance document.	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
ENISS	21	5.6	~~Particularly for external hazards, if the design basis for the plant is well established, it is expected that the frequency of occurrence of a natural hazard of a severity significantly exceeding the levels considered for design will be very low. However, as such frequencies are generally associated with significant uncertainties, the behaviour of structures, systems and components to loading parameters resulting from levels of external hazards exceeding those considered for the design should be well understood.~~ For natural external hazards, it is not always possible to get sufficient confidence in the frequency of occurrence of a certain level of hazard for the definition of a design basis level and furthermore for higher level. In that case, rather than trying to associate levels to frequencies, the level of natural hazards exceeding the level considered for design should be defined by the addition of a relevant margin. The behaviour of structures, systems and components to loading parameters resulting from these levels should be assessed.	The intent of these sentences is not clear. If the frequencies are uncertain, the levels of hazards to be considered will also be uncertain or at least will be difficult to define and in that case a "well understanding" of the situation is clearly not achievable. See suggestion for clarification.	X			

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Canada	49	5.8 list	*(e) A demonstration that the time available before a safety function is lost provides a sufficient margin over the time needed to perform all necessary actions to restore the safety function.*	Time required to start and initiate alternative services must be considered. Fixed equipment may require manual starting and connection which may be local to the equipment. Non-permanent equipment has additional issues, such as moving equipment into position (possibly from off-site). This is discussed in paras 5.13, 5.14 but should be included in this overview list.	X			
ENISS	22	5.8	For each relevant scenario involving an external hazard of a level ~~beyond the design basis~~, exceeding the level considered for the design should	Suggest to keep the SSR-2/1 wording. “Beyond the design” is an unlimited concept (there is always a beyond).	X			

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Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
ENISS	23	5.13	~~However, use of non-permanent equipment should be considered as backup to fixed equipment that might fail, including for short term actions, as it can provide innovative and diverse means to further reduce risk.~~ In addition, as per SSR-2/1 requirements, recalled in 5.3 above, even if not part of the coping strategy, the use of non-permanent equipment should be enabled by adequate provision (e.g. connection point), as it may ultimately provide means to further reduce risk.	This sentence is not clear and not consistent with following development on "coping time".. How can we say that a non-permanent equipment as a back-up of an action required to be done minutes after the event is reducing risks? The probability to fail to connect the equipment on time is almost certain and the risk reduction is close to 0. Suggest to delete this sentence.	X			
Canada	50	5.14 and 5.18	Delete "natural".	See above.	X			
UK	31	5.15 & 5.16		Valid and valuable points are being made here, but they do relate to operation of non-permanent equipment and coping strategies – is this appropriate for this guide which is on the 'design' of NPPs ?	X			Agree to delete these paragraphs since they are more appropriate for operation.

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ENISS	24	5.15/5.16	Once the coping strategies have been defined and validated, guidance for operators, as well as the technical basis of the strategies, should be established and documented (e.g. in emergency operating procedures or severe accident management guidelines). The installation and use of non-permanent equipment should then be subjected ~~to documented, and~~ comprehensive training, testing and drills, should be periodically conducted to maintain operator proficiency in the use of the equipment and associated procedures. To the extent possible, drills should consider the conditions of real emergencies.	5.16 statement seems redundant with 5.15. Probably better to group 5.16 and 5.15. See suggestion			X	Paras were deleted since they were considered out of the scope of this safety guide because they provide recommendations for the operation and deployment and not for the design and assessment.
Japan	12	Annex I-39	Risks for mechanical fuel failures need to be eliminated by the following means: (a) A design that ensures that heavy lifts (e.g. a transport cask) moving above the spent fuel stored in the pool are avoided; (b) Structures that eliminate the possibility of heavy lifts dropping on the top of the fuel.	For clarification, it seems better to add some examples which show what heavy lifts are.	X	As I-40 (a)		
France	12	Annex 1	Please add at the beginning of the annex: This annex is an illustration of potential examples and should be considered carefully: both list of example and contents of associated articles differ between different Member States.	Even if an annex is not really a part of the guidance, it is of high importance to highlight the precaution that should be taken with its content (there are concerns with several parts of this annex). Another solution to solve France concern is to delete this annex.	X			

Country	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
Canada	51	I-1 3rd sentence	*This is a very exceptional type of initiating event for which safety systems and safety features are not designed for its mitigation and therefore it needs to be demonstrated with high confidence that the likelihood of such an initiating event occurring would be ~~certainly~~ so low that it can be excluded, i.e. practically eliminated, from consideration.*	It is inconsistent to use "certainty" with reference to the likelihood of the event. It should be changed to use "high confidence".	X			
Germany	21	I-14 Line 2	For such situations, there need~~s~~ to be design provisions in place to ensure, with a high level of confidence, that such small coolant leaks or boiling of the coolant instead would result in a low pressure core melt sequence with a high reliability, so that high pressure core melt conditions can be practically eliminated.	Typo	X			
Canada	52	I-2 list	*This should include a continuous leak detection capability during pressurised operation.*	It is not clear if leak detection is intended in the list of aspects. It may be intended in item (f) but these seem to be limited to periodic surveillance. Consider adding a new sentence to (f) or a new item to ensure that leak detection is covered.		X ~~(e)~~(f) A continuous leak detection capability during pressurised operation;		
Canada	53	I-7 2nd sentence	*As far as ~~possible~~ practicable, the prevention of such accidents is to be ensured at the first level of defence in depth by proper design of the reactor coolant system and the core, or at the third level of defence in depth by provision of two diverse, independent means of shutdown.*	Normally the term "as far as practicable" is preferred. As currently worded, even impracticable measures must be taken if they are possible.	X			

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Canada	54	II-4	Delete the paragraph or rethink it.	We consider the statement to be misleading or incorrect. Take the example of station blackout which is loss of preferred and standby AC power. The backfit of an alternate power supply would deal with the station blackout just as effectively as if it had been in the original design. The frequency of various possible losses of AC power will dictate which plant state each combination falls in.			X	The para provides examples of what could be understood as design extension condition for a new and for an existing NPP.
Canada	55	II-5 2nd sentence	*There can, however, be constraints on installing the same type of design features as commonly implemented in the design of new nuclear power plants, ~~especially for design extension conditions with core melting~~.*	For PHWRs this emphasis on DEC-B is not strong. Provision of non-permanent equipment has addressed several DEC sequences without core melting through provision of means to recover heat sinks or provide alternative cooling options. Suggest deleting last part of sentence.		X There can, however, be constraints on installing the same type of design features as commonly implemented in the design of new nuclear power plants, especially for design extension conditions with core melting such as the implementation of the ex-vessel melt retention or in-vessel corium cooling strategies in PWR designs.		The last part of the sentence acknowledge that difficulties might arise to implement design features in existing NPPs for dealing with severe accident, such as core catcher or IVMR for PWR.

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Canada	56	II-7	Add new sentence to end of para: *Existing nuclear power plants could also extend the capability of safety systems to be capable of mitigation of some design extension conditions, in accordance with paragraph 5.27 of SSR-2/1 Rev/1 [1].*	SSR-2/1 para 5.27 also credits extension of the capability of safety systems. This could also apply to existing NPPs.	X			
Canada	57	II-8 last sentence Editorial	*Non-permanent equipment that would be necessary to reduce further the consequences of events that cannot be mitigated by the installed plant capabilities needs to be stored and protected to ensure its ~~timely~~ availability when necessary, with account taken of possible restricted access due to external events (e.g. flooding, damaged roads) and its operability needs to be verified.*	"Timely" is superfluous as "when necessary" is already in the sentence.	X			
ENISS	25	P 47	~~Matthieu, B. DIPNN, Electricité de France (EDF), France~~ Bernard M. DIPNN, Electricité de France (EDF), France	Common confusion between name and surname as both are possible. (M. Bernard MATHIEU has been working for EDF as bernard.mathieu@edf.fr but is now retired)	X			