Important note: This table presents the resolution of Member States' comments on DS494 that was prepared before the technical editing. Therefore, the uploaded version of DS494, which went through the technical editing, might not exactly correspond to the resolution of Member States' comments.

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
France - IRSN	1	1	1	This safety Guide, which supplements IAEA Safety Standards Series No. SSR-2/1 (rev. 1), Safety of Nuclear Power plants: Design [1], was prepared under IAEA`s programme for establishing Safety Requirements and Safety Guides ~~applicable to land base stationary water cooled nuclear power plants~~	Consider remove "applicable to land base stationary water cooled nuclear power plants" because this information is redundant with paragraph 1.4			X	The information in para. 1.1 applies to many safety guides. Additionally, in para. 1.4, only 'water cooled reactors' is mentioned to specify the scope of the safety guide.	
Germany	2	1	2	(…) Internal hazards due to electromagnetic fields or electromagnetic interference, and those due to the release of hazardous substances ~~inside the plant~~ originated within the site boundary are added in the scope of this safety guide. (…)	To be more specific and to be in line with the definition of an internal hazards provided in para. 2.5.	X				
Russia - Rosenergoatom	1	1	3	Reasonably practicable or achievable safety improvements*, systems of normal operation, technological processes and organizational procedures* are to be implemented in a timely manner.	Text in italics to be added: safety improvements can be achieved not only by direct improvement of safety systems.			X	Please consider this as a standard text used for many of our safety guides for design, consistently with SSR-2/1 (Rev.1), para 1.3	
Russia - Rostechnadzor	1	1	3	hazard assessment and design concepts for protection against internal hazards in ~~new~~ nuclear… Taking into account that possibilities of implementation of these guidance recommendations may significantly differ at new and already constructed NPPs for plants designed with earlier standards, comprehensive safety assessments are to be carried out considering these recommendations in order to identify another ways of safety improvements that are oriented to prevent accidents with radiological consequences and mitigate such consequences should they occur.	Standards at the level of requirements and recommendations have to be applied to all nuclear power plants - both new, and designed and constructed before of release of the new standard. However, possibilities of implementation of requirements or recommendations of the new standard for the old and new NPPs are significantly various. In this regard it is offered to exclude the word "new" in the mentioned line, and to begin the third sentence of the same paragraph with words: "Taking into account that possibilities of implementation of these recommendations and guidance may significantly differ at the new and already constructed NPPs". Besides, the words "another ways of" should be inserted in the same sentence after the words "to identify" and further in the text.			X	Standard wording used in all our design safety guides.	
France - IRSN	2	1	4	…It is recognized that for innovative developments in future systems, modifications or other reactor types, including~~innovative developments in future systems~~, some parts of this Safety Guide might not be applicable or might need some judgement in their interpretation.	Change order to link first to the motioned water cooled reactors and then to extent to new reactor types. There might be always parts of the guide which are not applicable and require interpretations.	X				
USA	2	1	4	Add the following sentence to the end of the paragraph: "Each nuclear plant design will have its own unique design attributes and consequently, its own unique hazards for which this Safety Guide can help to determine design solutions tailored to each plant."	Clarifies the expectations for the users of this safety guide.		X		Covered by the consolidated para. 1.4.	
WNA	1	1	4	…It is recognized that for innovative developments in future systems, modifications or other reactor types, including ~~innovative developments in future systems~~, some parts of this Safety Guide might not be applicable or might need some judgement in their interpretation.	Change order to link first to the motioned water cooled reactors and then to extent to new reactor types. There might be always parts of the guide which are not applicable and require interpretations.	X				
ENISS	3	1	5	1.5. This Safety Guide covers the design features necessary to protect items important to safety in nuclear power plants against the effects of internal hazards. The following internal hazards are reviewed in this Safety Guide: fires; explosions; missiles; pipe breaks; floods; ~~collapse of structures, falling objects and~~ heavy load drop; electromagnetic interference; and release of hazardous substances inside the plant. This Safety Guide does not cover conventional aspects of protection or the safety of plant personnel, or the protection of property.	See comment on §4.172.			X	To be consistent with the wording of SSR-2/1 (Rev.1) and with the changes made for the first submission to NUSSC. However, it is recognized that the focus was on heavy load drop.	
France - IRSN	3	1	5	General comment : see on the right	Handling hazard (load drop and collision) should be considered separately from 'falling structures' due to external hazards for example. Collapse of structure not resulting from another specific hazard should not be considered.				See resolution of related comments from ENISS.	6 (same as FR7 and UK3)
France - IRSN	4	1	5	….release of hazardous substances inside the plant. ~~This Safety Guide does not cover conventional aspects of protection or the safety of plant personnel, or the protection of property.~~	Should not explicitly mentioned as all convention rules are in line with the defense-in-depth lines. Furthermore in particular for personnel protection this is contraire to section 4.16 …"*minimize the adverse effects on items important to safety and to plant personnel.* ", and section 4.34 ".. *(b) To provide safe escape and access routes for personnel;* ".		X		With modification: This Safety Guide does not cover conventional industrial safety that under no circumstance could affect the safety of the nuclear power plant.	
Germany	3	1	5	(…) The following internal hazards are reviewed in this Safety Guide: fires; explosions; missiles; pipe breaks; floods; collapse of structures, falling objects and heavy load drop; electromagnetic interference; and release of hazardous substances ~~inside the plant~~ originated within the site boundary. (…)	To be more specific and to be in line with the definition of an internal hazards provided in para. 2.5.	X				
Poland	1	1	5	"The following internal hazards are reviewed in this Safety Guide: fires; electric short circuits; explosions; missiles; pipe breaks; floods; collapse of structures, falling objects and heavy load drop; electromagnetic interference; and release of hazardous substances inside the plant."	The safety guide should provide recommendations for protection against electric short circuits (electric shortcuts) internal hazards. Electric short circuits should be reviewed as separate class internal hazard as short circuits can cause (trigger) AOO's at nuclear power plants and nuclear facilities without causing fire or explosions. Electric short circuit can cause electric plasma effect, strong enough to melt down metallic structures. Currently only paragraph 4.15 briefly mentions short circuit as a potential hazard for cable overheating.			X	The list of hazards is consistent with the DPP that was approved by the review committees and the CSS.	
Russia - Rosenergoatom	2	1	5	This Safety Guide does not cover conventional aspects of protection or the safety of plant personnel, or the protection of the property	Explanation of what is meant by "conventional aspects of protection or the safety of plant personnel" needs to be given.	X			Please refer to the new para. 1.5.	5 (2.12 (e))
WNA	2	1	5	General comment : see on the right	Handling hazard (load drop and collision) should be considered separately from 'falling structures' due to external hazards for example. Collapse of structure not resulting from another specific hazard should not be considered.		X		Please refer to the integrated resolution of similar comments	

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WNA	3	1	5	….release of hazardous substances inside the plant. ~~This Safety Guide does not cover conventional aspects of protection or the safety of plant personnel, or the protection of property.~~	Should not explicitly mentioned as all convention rules are in line with the defense-in-depth lines. Furthermore in particular for personnel protection this is contraire to section 4.16 …"*minimize the adverse effects on items important to safety and to plant personnel.* ", and section 4.34 ".. *(b) To provide safe escape and access routes for personnel;* ".		X With modification: This Safety Guide does not cover conventional industrial safety that under no circumstance could affect the safety of the nuclear power plant.		Wording from IAEA safety standards.	
Armenia	2	1	6	"The screening criteria can be deterministic, probabilistic or combination of those two."	In some cases the screening criteria can have combined nature of deterministic and probabilistic to have precise understanding of consequences and its occurrence frequency.	X			Although the 'or' is inclusive.	
ENISS	4	1	6	1.6. Section 2 outlines general considerations for protection against internal hazards in nuclear power plants. Section 3 describes a common approach for building general design recommendations against internal hazards in nuclear power plants. Section 4 highlights considerations in and provide recommendations for protection against fires, explosions, missiles, pipe breaks, floods, collapses of structures~~, falling objects~~ and heavy load drop, electromagnetic interference, and release of hazardous substances inside the plant. Two appendices provide further guidance for protection against internal hazards in the design of nuclear power plants.	See comment on §4.172.			X	See previous comment.	10 (2.12 (e)) same as FR10 (2.12 (e))
USA	3	2	2	In section 2., "General Considerations, add the following text as a new paragraph: "For Instrumentation and Control (I&C) components or systems, hazards that could challenge plant safety should be identified. The hazard identification process should complement the plant safety analyses (e.g. consider hazards not analyzed). The hazard identification for I&C components or systems should also consider: (1) hazards resulting from effects such as equipment ageing and operational procedure changes; (2) hazards that arise from interactions between I&C systems and other plant systems; and (3) the need to revisit the assessment at appropriate times (e.g. digital upgrades, changing or emerging information regarding internal hazards to I&C systems)."	The new text provides additional considerations for I&C equipment during the hazards identification process.			X	There is no need to be specific for I&C that are addressed in SSG-39.	and UK5 (2.12 (e))
China	14	2	4	In the text, safety features for DEC are part of the items important to safety. According to the requirements, "item important to safety" needs to be considered in protection design against internal hazards. However, some hazards are postulated to occur in normal operation conditions, please clarify whether safety features for DEC should be considered.			X An item important to safety is defined in the IAEA Safety Glossary [4] as an item that is part of a safety group and/or whose malfunction or failure could lead to radiation exposure of the site personnel or members of the public. According to this definition and to the definition of design extension conditions (DEC) in Ref. [1], safety features for DEC are part of the items important to safety. Therefore the potential consequences of hazards affecting safety features for DEC also need to be considered in the safety demonstration.		Integrated resolution taking into account other comments. As it is explained in this safety guide, items important to safety need to withstand or to be protected against hazards. Safety features for DEC are part of the items important to safety.	
France - IRSN	5	2	4	An item important to safety is defined in the IAEA Safety Glossary [4] as an item that is part of a safety group and/or whose malfunction or failure could lead to radiation exposure of the site personnel or members of the public. According to this definition and to the definition of design extension conditions (DEC) in Ref. [1], safety features for DEC are part of the items important to safety. Therefore the potential consequences of hazards affecting safety features for DEC also need to be considered in the safety demonstration.	After reading 2.4, the reaction of the reader is « so what ? ». 2.4 should either be deleted or completed as proposed. In addition, the following general comment can be made : The description on "safety group" and even "redundancy" in [8] is sufficient and capture the target. However in this context "train" or "division" is used (quite often even in this document) although not defined in [8]. A definition of "train" or "division" is necessary or it should not be used in the document. Within IAEA document there shall be consistency. There exist a quite old IAEA description for "division" (unfortunately we could not recover the reference) where a division was specified as some kind of geographical arrangement of redundant items important to safety (more aligned to safety systems). Each division contains different safety systems (and even may contain items not important to safety) but only one redundancy of each safety system. This definition provides contribution to the fact that different safety systems may share certain components (e.g. a diesel generator or switchgear).	X			Definition of division has been introduced in the daraft safety guide to remove the confusin between train and division. The term 'train' is more or less defined in the IAEA safety glossary. The use of division is made consistently with NS-G-1.7.	
Poland	2	2	4	"An item important to safety is defined in the IAEA Safety Glossary [4] as an ~~item~~ SSC's that is part of a safety group and/or whose malfunction or failure could lead to radiation exposure of the site personnel or members of the public."	IAEA Safety Glossary [4] defines, that in the context of nuclear safety term *"item"* should be understand as *"structure, system or component"*. Definition of *"items important to safety"* without providing definition of the term *"item"* itself is not sufficient. Proper complete definition should be provided including definition of the term *"item"* or term *"item"* changed to the relevant term *"structure, system or component (SSC's)"* in the entire document. It should be noted that in many other paragraphs (see 3.5, 3.20, 4.6(h), 4.19 etc.) the term *"SSC's important to safety"* are used, but the link of SSC's with *"item"* is not clarified. It is recommended to use one single and unified term *"SSC's important to safety"* in the entire document.		X		There is no need to provide definitions included in IAEA safety glossary since the definition of items exists in the IAEA safety glossary and is used e.g. in SSR-2/1 (Rev.1) without definition. The objective of this paragraph was to introduce safety feature for DEC as item important to safety. The part of the comment related to using one single term is however accepted and definition of items is first given in para. 1.5.	
UK	1 (Framatone)	2	4	An item important to safety is defined in the IAEA Safety Glossary [4] as an item that is part of a safety group and/or whose malfunction or failure could lead to radiation exposure of the site personnel or members of the public. According to this definition and to the definition of design extension conditions (DEC) in Ref. [1], safety features for DEC are part of the items important to safety. Therefore the potential consequences of hazards affecting safety features for DEC also need to be considered in the safety demonstration.	*"After reading 2.4, the reaction of the reader is « so what ? ». 2.4 should either be deleted or completed as proposed. In addition, the following general comment can be made : The description on "safety group" and even "redundancy" in [8] is sufficient and capture the target. However in this context "train" or "division" is used (quite often even in this document) although not defined in [8]. A definition of "train" or "division" is necessary or it should not be used in the document. Within IAEA document there shall be consistency. There exist a quite old IAEA description for "division" (unfortunately we could not recover the reference) where a division was specified as some kind of geographical arrangement of redundant items important to safety (more aligned to safety systems). Each division contains different safety systems (and even may contain items not important to safety) but only one redundancy of each safety system. This definition provides contribution to the fact that different safety systems may share certain components (e.g. a diesel generator or switchgear)*". ONR -There is a need to define safety division and train in the safety guide.		X		Definition of division has been introduced in the daraft safety guide to remove the confusin between train and division. The term 'train' is more or less defined in the IAEA safety glossary. The use of division is made consistently with NS-G-1.7. Redundant division was used in NS-G-1.7.	
USA	4	2	4	Add the following sentence to the end of paragraph 2.4: "DEC analyses are to be performed for new nuclear power plants and, as far as reasonably practicable or achievable, also for the safety re- evaluation or assessment of existing nuclear power plants when operating organizations review their safety assessment."	This sentence makes this safety guide consistent with revised SSG-2, paragraph 1.6, that NuSSC approved.			X	Please consider that the scope of this safety Guide is the protection of items important to safety against internal hazards. Considerations on DEC should be limited to the minuimum. Additionally, the consolidated para. 2.4 is now explaining the link with DEC through the protection of safety features for DEC against internal hazards.	

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WNA	4	2	4	An item important to safety is defined in the IAEA Safety Glossary [4] as an item that is part of a safety group and/or whose malfunction or failure could lead to radiation exposure of the site personnel or members of the public. According to this definition and to the definition of design extension conditions (DEC) in Ref. [1], safety features for DEC are part of the items important to safety. Therefore the potential consequences of hazards affecting safety features for DEC also need to be considered in the safety demonstration.	After reading 2.4, the reaction of the reader is « so what ? ». 2.4 should either be deleted or completed as proposed. In addition, the following general comment can be made : The description on "safety group" and even "redundancy" in [8] is sufficient and capture the target. However in this context "train" or "division" is used (quite often even in this document) although not defined in [8]. A definition of "train" or "division" is necessary or it should not be used in the document. Within IAEA document there shall be consistency. There exist a quite old IAEA description for "division" (unfortunately we could not recover the reference) where a division was specified as some kind of geographical arrangement of redundant items important to safety (more aligned to safety systems). Each division contains different safety systems (and even may contain items not important to safety) but only one redundancy of each safety system. This definition provides contribution to the fact that different safety systems may share certain components (e.g. a diesel generator or switchgear).	X			Definition of division has been introduced in the daraft safety guide to remove the confusin between train and division. The term 'train' is more or less defined in the IAEA safety glossary. The use of division is made consistently with NS-G-1.7.	
France - IRSN	6	2	9	Credible combination of hazards (independent or dependent) are also considered within the scope of this safety guide	Need to be specified according to appendix I.		X		Credible combination of hazards (see Appendix I) are also considered within the scope of this safety guide	
Germany	4	2	9	Credible combinations of hazards should be ~~are also~~ considered ~~within the scope of this safety guide~~ in the design to protect the nuclear power plant against internal hazards.	Para. 2.9 shall be formulated more in form of a recommendation. The content of the safety guide is already introduced in para. 1.3.			X	In Section 2, only statements are provided, no recommendation.	
Iran	1	2	9	All credible combinations of hazards are also considered within the scope of this safety guide.	It is necessary to emphasize that all combinations of hazards should be considered	X				
UK	2 Framatone	2	9	Credible combination of hazards (independent or dependent) are also considered within the scope of this safety guide	"*Need to be specified according to appendix 1*."		X		All Credible combinations of hazards (see Appendix I) are also considered within the scope of this safety guide	
WNA	5	2	9	Credible combination of hazards (independent or dependent) are also considered within the scope of this safety guide	Need to be specified according to appendix I.		X All credible combination of hazards (see Appendix I) are also considered within the scope of this safety guide		Integrated resolution of similar comments.	
France - IRSN	7	2	10	Internal hazards have the potential in particular to induce initiating events, to change the range of occurrence frequency of a postulated initiating event, to cause failures of equipment that is necessary to mitigate them, and to adversely affect, directly or indirectly, the barriers for prevention of the release of radioactive materials.	Need to check that internal hazards which could occur frequently in the lifetime of the plant cannot induce directly DBC3 or 4.			X	Although this statement could be true, it does not bring an added value in the context of this paragraph.	
UK	3 (Framatone)	2	10	Internal hazards have the potential in particular to induce initiating events, to change the range of occurrence/ frequency of a postulated initiating event, to cause failures of equipment that is necessary to mitigate, and to adversely affect, directly or indirectly, the barriers for prevention of the release of radioactive materials.	"*Need to check that internal hazards which could occur frequently in the lifetime of the plant cannot induce directly DBC3 or 4.*" ONR: Removed "them", the comment from Framatone was accepted.			X	Although this statement could be true, it does not bring an added value in the context of this paragraph.	
WNA	6	2	10	Internal hazards have the potential in particular to induce initiating events, to change the range of occurrence frequency of a postulated initiating event, to cause failures of equipment that is necessary to mitigate them, and to adversely affect, directly or indirectly, the barriers for prevention of the release of radioactive materials.	Need to check that internal hazards which could occur frequently in the lifetime of the plant cannot induce directly DBC3 or 4.			X	Although this statement could be true, it does not bring an added value in the context of this paragraph.	
Germany	5	2	11	While it is not practical or possible to prevent an internal hazard from triggering an anticipated operational occurrence (AOO), one of the layout and design objectives is to ensure that internal hazards do not trigger an accident condition to the extent practicable.	According to the safety glossary the term 'accident conditions' for the plant states (DBA and DEC) shall be applied.	X				
Japan	2	2	11	Move after para 2.12 with following modification; 2.12. bis ~~While~~ When it is not practical or possible to prevent an internal hazard from triggering an anticipated operational occurrence (AOO), one of the ~~layout and design~~ objectives of safety design including layout is to ensure that internal hazards do not trigger an accident to the extent practicable.	The first sentence leads to misunderstand safety design of NPPs. To prevent AOO due to internal hazards is also the purpose of safety design. In this context, para 2.11 is suggested to be moved after para 2.12, in which basic consideration of internal hazards in the design of NPPs, with some modifications.			X	The statement seems not have been understood and while should not be replaced by when. Also, it is usual to distinguish design and layout. Safety design is not clear.	
Mexico	1	2	11	While it is known that internal hazards have the potential to trigger Anticipated Operational Occurrence (AOO), one of the layout and design objectives is to ensure that internal hazards do not trigger an accident to the extent practicable.	Because in the reality, the objective of the design and the layout is to prevent the Internal hazards that lead to an AOO and then to an accident. It the paragraph says that is not practical or possible to prevent these hazards, all the contents of this guide are useless. On the other hand, if the text refers to internal hazards from AOO, it results contradictory with the previous paragraph because of it says that the AOO can be perform due to an internal hazard.			X	There is a misunderstanding of the paragraph which states that one of the objectives of the layout and design is to avoid, to the extent practicable, that an accident be triggered by a hazard.	
Poland	3	2	11	"While it is not practical or possible to prevent an internal hazard from triggering an anticipated operational occurrence (AOO), one of the layout and design (?) objectives is to ensure that internal hazards do not trigger an accident to the extent practicable."	It is unclear whose, what objects layout and design are considered here. Proper clarification should be provided.			X	It is clear from the title of the safety guide that we are addressing the layout and design of a nuclear power plant.	
China	15	2	12	Could you please clarify what this item is based on and give an example of this case because it is recognized that safety systems designed to control design basis accidents, and safety features required in the event of accidents with core melting belong to two different levels of defense in depth, and a common cause failure might not exist between them.				X	A common cause failure does not exist if the design provides provisions for that. For example, if appropriate provisions are not taken, a fire in the containment can impair both systems needed to cope with DBA and systems that may be needed for severe accidents.	
ENISS	5	2	12	2.12. The aim of considering internal hazards in the design of nuclear power plants is to ensure that the fundamental safety functions are fulfilled in any plant state and that the plant can be brought to and maintained in a safe shutdown state after any credible internal hazard occurrence. This implies that: (a) The redundancies of the systems ~~are~~ should be segregated to the extent possible or adequately separated, and protected as necessary to prevent the loss of the safety function performed by the systems; (b) ~~The design … extent practicable ; (c) The implemented…internal hazard ; (d) The design … core melting ; (e)~~ An internal hazard occurring elsewhere in the plant ~~does~~ should not affect the habitability of the main control room. In case the latter is not habitable, access to the supplementary control room is to be ensured. In addition, and when necessary, access by plant personnel to equipment in order to perform local actions is also to be possible.	See General comment #1. §2.12 is split into §2.12 and §2.13. Furthermore, c) which is in fact a proposed means to achieve the main safety objectives, is detailed and more explicitly written in §3.30. We propose to remove it from this part of the document.	X (for credible)		X	This paragraph describes both the objectives and the means to achieve them. There is no need to split it. The "should" is also rejected for editorial reasons.	

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ENISS	6	2	12	NEW *2.13* The design of structures, systems and components (SSCs) should be such that design basis accidents or design extension conditions induced by internal hazards are avoided to the extent practicable. Furthermore, the design should be such that an internal hazard does not lead to a common cause failure between safety systems designed to control design basis accidents, and safety features required in the event of accidents with core melting.	See General comment #1. Second part of former §2.12: Additional principles.			X	See previous comment.	
Finland	2	2	12	2.12. The aim of considering internal hazards in the design of nuclear power plants is to ensure that the fundamental safety functions are fulfilled in any plant state and that the plant can be brought to and maintained in a safe shutdown state after any internal hazard occurrence. This implies that: (a) Adequate physical separation and protection is applied between the redundancies of the systems to prevent the loss of the safety function performed by the systems; …	clarity; (a) The redundancies of the systems are segregated to the extent possible or adequately separated, and protected as necessary to prevent the loss of the safety function performed by the systems;			X	Please consider that the proposal does not bring more clarity and does not contain segregation.	
France - IRSN	8	2	12	The implemented segregation, separation and protection are adequate to ensure that the modelling of the system response described in the analysis of PIEs is not compromised by the effects of the internal hazard that could initiate this PIE. If the initial PIE analysis is impacted by the hazard, additional analysis should be performed.	This is a very important comment. It is generally better if redundancies of safety systems are never simultaneously affected by the hazard, however such protection could be not achievable in some cases and then credit should be allowed from the fact than no PIE requiring the use of this system is induced. For instance it is acceptable to lose a system dedicated so severe accident (not redundant) if no PIE is initiated.			X	The proposal is implicit and is already embedded in the initial 2.12 (c)	
France - IRSN	9	2	12	The design is such that an internal hazard does not lead to a common cause failure between ~~safety systems designed to control design basis accidents, and safety features required in the event of accidents with core melting;~~ redundant safety systems designed to control design basis accidents, and between these systems and safety features required in the event of accidents with core melting;	It is also necessary to avoid the common mode failure between the systems : the original test is ambiguous	X				
France - IRSN	10	2	12	An internal hazard occurring elsewhere in the plant does not affect the habitability of the main control room. In case of the latter is not habitable, access and habitability to the supplementary control room ~~is~~ are to be ensured.	Same requirement for the supplementary control room as for the main control room.		X An internal hazard occurring elsewhere in the plant does not affect the habitability of the main control room. In case of the latter is not habitable, access to, and habitability of the supplementary control room ~~is~~ are to be ensured.		Better formulation	
Germany	6	2	12	The aim of considering internal hazards in the design of nuclear power plants is to ensure that the fundamental safety functions are fulfilled in ~~any plant state~~ operational states, design basis accidents and design extension conditions without core melt and that the plant can be brought to and maintained in a safe shutdown state after any internal hazard occurrence. This implies that:(…)	In case of DEC with core melt ensuring the fundamental safety functions would be difficult. Usually, a core melt accident results from a loss of a fundamental safety function (e.g. loss of cooling, reactivity induced accident).			X	Para. 2.12 does not state that in case of DEC with core melting, the fundamental safety functions are simultaneously fulfilled.	5 (same as FR6 and UK2)
Germany	7	2	12	(c) The implemented segregation, separation and protection are adequate to ensure that ~~the modelling of~~ the system response described in the analysis of PIEs is not compromised by the effects of the internal hazard;	The modelling will not be compromised (clarification)	X				
Japan	3	2	12	Modify as follows; … that the plant can be brought to and maintained in a safe shutdown state after any postulated internal hazard occurrence.	Clarification. It may be possible to bring and maintain the plant in a safe shutdown state after identified occurrence. The objects of "any" should be clarified.		X 'Credible' is proposed instead of 'postulated'		Better wording	
Japan	4	2	12	The design of individual structures, systems and components (SSCs) is such that AOO, design basis accidents or design extension conditions induced by internal hazards are avoided to the extent practicable;	Clarification. The purpose of the first level of defence is to prevent AOOs.			X	See para. 2.11. It is not possible to prevent that an AOO is triggered by an internal hazard.	
Russia - Rosenergoatom	3	2	12	The implemented segregation, separation and protection are adequate to ensure that the modelling of the system response described in the analysis of PIEs is not compromised by the effects of the internal hazard *on the critical for the safety assemblies* ;	Text in italics to be added			X	The wording and terminology proposed are not clear: what is the meaning of 'critical for the safety assemblies'?	
Russia - Rosenergoatom	4	2	12	In case the [main control room] is not habitable, access to the supplementary control room is to be ensured	In Russian terminology the definition "reserve control room" is used instead of "supplementary control room".			X	'Supplementary control room' is the terminology used in all IAEA safety standards.	
Russia - Rosenergoatom	5	2	12	(f) Design of individual constructions, systems and elements or process rooms for their deployment should, where necessary, include their equipment with relevant instrumentation and control devices for operative remote detection of internal hazard.	Insertion of a new paragraph (f) is suggested.			X	Detection of internal hazards is addressed for the different hazards as applicable. Not all internal hazards can be detected.	
UK	4 (BAE)	2	12	The implemented segregation, separation and protection are adequate to ensure that credited system responses described in the analysis / modelling of PIEs is not compromised by the effects of the internal hazard"	From BAE – "*Would recommend rewording bullet c* ." ONR: rewording is needed as segregation etc. is not implemented to ensure the modelling of the system response. Modelling is a tool whose outputs can then be used to define the feature required to provide segregation etc. Alternative text needed in this paragraph		X The implemented segregation, separation and protection are adequate to ensure that the system response described in the analysis of PIEs is not compromised by the effects of the internal hazard		Resoves both the German and UK comments.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
UK	5 (Framatone)	2	12	(e) An internal hazard occurring elsewhere in the plant does not affect the habitability of the main control room. In case of the latter is not habitable, access and habitability to the supplementary control room ~~is~~ are to be ensured.	"*Same requirement for the supplementary control room as for the main control room.*"		X An internal hazard occurring elsewhere in the plant does not affect the habitability of the main control room. In case of the latter is not habitable, access to, and habitability of the supplementary control room ~~is~~ are to be ensured.		Better formulation	
WNA	7	2	12	(b) The design of individual structures, systems and components (SSCs) is such that design basis accidents or design extension conditions potentially induced by internal hazards are avoided to the extent practicable;	More clear: any DBA may have several possible causes and hazard is just one of them	X				
WNA	8	2	12	(c) The implemented segregation, separation and protection are adequate to ensure that the modelling of the system response described in the analysis of PIEs is not compromised by the effects of the internal hazard that could initiate this PIE. If the initial PIE analysis is impacted by the hazard, additional analysis should be performed.	This is a very important comment. It is generally better if redundancies of safety systems are never simultaneously affected by the hazard, however such protection could be not achievable in some cases and then credit should be allowed from the fact than no PIE requiring the use of this system is induced. For instance it is acceptable to lose a system dedicated so severe accident (not redundant) if no PIE is initiated.			X	The proposal is implicit and is already embedded in the initial 2.12 (c)	
WNA	9	2	12	.. (d) The design is such that an internal hazard does not lead to a common cause failure between redundant trains of safety systems designed to control design basis accidents, and safety features required in the event of accidents with core melting;	Different safety systems are typically grouped together. The safety function of each safety system shall be warranted.		X The design is such that an internal hazard does not lead to a common cause failure between redundant safety systems designed to control design basis accidents, and between these systems and safety features required in the event of accidents with core melting.		Please refer to the integrated resolution of similar comments.	
WNA	10	2	12	(e) An internal hazard occurring elsewhere in the plant does not affect the habitability of the main control room. In case of the latter is not habitable, access and habitability to the supplementary control room ~~is~~ are to be ensured.	Same requirement for the supplementary control room as for the main control room.		X An internal hazard occurring elsewhere in the plant does not affect the habitability of the main control room. In case of the latter is not habitable, access to, and habitability of the supplementary control room ~~is~~ are to be ensured.		Better formulation	10 (2.12 (e)) same as FR10 (2.12 (e)) and UK5 (2.12 (e)).
ENISS	7	2	13	*NEW 2.14* In accordance with the concept of defence in depth … in order to ensure protection against those internal hazards.	Text of former §2.13 is now numbered §2.14			X	See resolution of comment No. 5.	
France - IRSN	11	2	13	In accordance with the concept of defence in depth (the first level of defence in depth), protection against internal hazards is provided in general by high quality and reliability of SSCs, by environmental qualification of the SSCs, by application of principles of redundancy, diversity, and by spatial separation, segregation, and design of appropriate provisions ~~barriers~~.	The word "barrier" seems not appropriate here or at least not sufficient		X In accordance with the concept of defence in depth (the first level of defence in depth), protection against internal hazards is provided in general by high quality and reliability of SSCs, by environmental qualification of the SSCs, by application of principles of redundancy, diversity, and by spatial separation, segregation, and design of appropriate barriers and other protective means.		More clear formulation; 'provision' is too general.	
Germany	8	2	13	In accordance with the concept of defence in depth (the first level of defence in depth), protection against internal hazards is provided in general by high quality and reliability of SSCs, by environmental qualification of the SSCs, by application of principles of redundancy, diversity, and by spatial separation, segregation, and design of appropriate barriers. Therefore, the design against effects of internal hazard is an iterative process, integrating the needs of protection ~~of~~ against several internal hazards. Proper surveillance and in-service inspections of SSCs should be implemented for early detection of the occurrence of an internal hazard or signs that may lead to the occurrence of internal hazards ~~occurrences~~ and implementation of necessary corrective actions (the second level of defence in depth) in order to ensure protection against those internal hazards.	For some internal hazards that appear suddenly there is no possibility of early detection of the event itself, e.g. for load drop or pipe break. Yet damage or degradation may be detectable.	X				
UK	6 (Framatone)	2	13	Remove "the first level of defence in depth"	"*General comment : 2.13 is not clear and of little added value. Clarify or remove. For example, spatial separation, segregation and design of appropriate barriers are not part of first level of DiD against internal hazards. They are implemented to limit the consequences of the initial hazard and avoid spreading of the hazard and/or of its consequencial effects. Neither are redundancies and diversity.*" ONR suggests reword to remove (the first level of defence in depth) - all the features separation, segregation and design of barriers are part of the defence-in-depth strategy.		X In accordance with the concept of defence in depth (the first level of defence in depth), protection against internal hazards is provided in general by high quality and reliability of SSCs, by environmental qualification of the SSCs, by application of principles of redundancy, diversity, and by spatial separation, segregation, and design of appropriate barriers and other protective means.			
UK	7 (BAE)	2	13	Consider adding "Also, it is often more practical to identify and eliminate hazards at the earlier design stages using qualitative methods e.g. Hazard Identification and re-engineering and this does not generally require detailed risk analysis."	"*Early design stage HAZID should employ systems engineering techniques like SWIFT.This comes in later.*" ONR proposes the new text to address this comment		X Early design stage Hazard Identification (HAZID) is often used as a practical and qualitative method to identify and eliminate hazards.		More precise and explicit formulation, avoiding the use of 'should' in Section 2.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
WNA	11	2	13	General comment : 2.13 is not clear and of little added value. Clarify or remove. For example, spatial separation, segregation and design of appropriate barriers are not part of first level of DiD against internal hazards. They are implemented to limit the consequences of the initial hazard and avoid spreading of the hazard and/or of its consequencial effects. Neither are redundancies and diversity.			X In accordance with the concept of defence in depth (the first level of defence in depth), protection against internal hazards is provided in general by high quality and reliability of SSCs, by environmental qualification of the SSCs, by application of principles of redundancy, diversity, and by spatial separation, segregation, and design of appropriate barriers and other protective means.		Integrated resolution of similar comments. Please refer to the consolidated para. 2.13.	
WNA	12	3	1	Notwithstanding the measures taken to minimize the likelihood of ~~an~~ internal hazards which cannot be excluded, such remaining hazards are possible and the capability of the nuclear power plant to withstand internal hazards and to mitigate PIEs generated by them should be an integral part of the design of the plant?	It is possible to justify that certain hazards can be excluded in certain areas. In such cases, it is not necessary to consider the resulting PIE. The term "generated" seemed to be forgotten.			X	Please consider that the formulation is more clear in the original text. In particular, the term 'generated' is there under 'caused b'.	
ENISS	8	3	2	The design approach proposed in this Safety Guide for the protection of items important to safety and, as applicable, of plant personnel performing actions important to safety against internal hazards is based on the following major steps: (a) Identification of internal hazards and the ~~possible~~ credible hazards combinations, and characterisation of the hazard effects; (b) Design for prevention of occurrence of internal hazards or adverse effects of internal hazards; (c) Design of means for mitigation of adverse effects of internal hazards to items important to safety. The approach also includes the definition of ~~success criteria for the protection against internal hazards in consistency with the objectives of paragraph~~	It's preferable to use "credible" instead of "possible", as different possibilities could be credited but they shall be credible/plausible (cf footnote 1 for §3.6). Prevention may consist in avoiding occurrence of internal hazards (e.g. use of non-combustible material, prevention of ignition...).	X				
France - IRSN	12	3	2	c) As relevant, design of …	In specific cases, (a) and (b) can be considered as sufficient to exclude the occurrence of the hazard and therefore (c) is not necessary (e.g. hydrogene explosion can be "excluded" in battery rooms)			X	Para. 3.2 contains already "as applicable" and there is no need to single out this for the bullet (c).	
France - IRSN	13	3	2	The approach also includes the ~~definition of success criteria~~ assessment of the protection against internal hazards in consistency with the objectives of paragraph 2.12 and the verification that these objectives ~~success~~ criteria are met for all hazards of the plant.	The concept of "success criteria" is not consistent with all practices whilst it may oversimplified hazards assessment		X The approach also includes the assessment of the protection against internal hazards in consistency with the objectives of paragraph 2.12 and the verification that these objectives are met for all hazards of the plant.		Better wording.	
Russia - Rostechnadzor	2	3	2	Design for prevention of internal hazards and its adverse effects ~~of internal hazards~~;	It is necessary to prevent not only negative consequences of internal hazards, but also hazards themselves.		X Design for prevention of occurrence of internal hazards or adverse effects of internal hazards		Better wording	
WNA	13	3	2	c) As relevant, design of …	In specific cases, (a) and (b) can be considered as sufficient to exclude the occurrence of the hazard and therefore (c) is not necessary (e.g. hydrogene explosion can be "excluded" in battery rooms)			X	Para. 3.2 contains already "as applicable" and there is no need to single out this for the bullet (c).	
China	16	3	4	Please clarify the specific value of acceptably low.	Acceptably low is not easy to execute in design.			X	The meaning is clear (= low enough to comply with the values or objectives set-up by the regulatory body or good international practices) and we try to avoid prescribing numeric acceptance criteria in IAEA safety guides.	
Germany	9	3	4	Certain postulated hazards might be of such magnitude that providing design features to mitigate them is not practicable (e.g. uncontrolled drop of reactor vessel head). In this case, the focus is on prevention and an evaluation should be performed to ensure that ~~the likelihood of~~ such events ~~is~~ are extremely unlikely with a high degree of confidence. (…)	In case mitigation is not practicable, those hazards have to be eliminated by reliable design provisions (i.e. to be practically eliminated).		X Certain postulated hazards might be of such magnitude that providing design features to mitigate them is not practicable (e.g. uncontrolled drop of reactor vessel head). In this case, the focus is on prevention and an evaluation should be performed to ensure that ~~the likelihood of~~ such events ~~is~~ are extremely unlikely with a high level of confidence		Better terminology: degree changed in level	
France - IRSN	14	3	5	During plant design, internal hazards should be identified on the basis of a combination of deterministic and probabilistic considerations, operational experience, lessons learned from similar plant designs and engineering judgment. The identification and the characterisation […] and the possible impacts on SSCs important to safety or on potential PIE initiators.	Given the usual practices, a different enumeration of the factors to consider during the plant design Hazards affecting non safety classified SSCs could generate a PIE	X		X	The first modification is rejected because the new formulation is just a change of the order in the initial wording.	
Russia - Rosenergoatom	6	3	5	The identification and the characterization include the consideration of ~~hazard~~ initial conditions ….	Stand-by regime at NPP should not be classified as an internal hazard. Either the "internal hazard' needs to be replaced with an "initial condition" or the paragraph 3.5 should be reconsidered on the whole.			X	Hazard initial conditions means here the initial conditions at which the hazard occurs; this similar to accident initial conditions.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Russia - Rosenergoatom	7	3	5	The hazard *reveal,* identification and characterization process should be rigorous, supported by plant walk-down for verification, and well documented. *This process should be based on experience of operation of NPPs of the sane design. During the operation phase NPPs should be monitored by operational checks, inspections and remedial actions at critical for safety assemblies.*	Approaches to the management of internal hazard factors should be split: (1) List and characteristics of hazard factors are defined at the design phase; (2) Monitoring and control of hazard factors take place during operation in process of operational checks, inspections and remedial actions.			X	The proposed text in italic is already reflected in the 1st sentence of para. 3.5.	
UK	8 (Framatone)	3	5	… and the possible impacts on SSCs important to safety or on potential PIE initiators.	"Hazards affecting non safety classified SSCs could generate a PIE"	X				
WNA	14	3	5	… and the possible impacts on SSCs important to safety or on potential PIE initiators.	Hazards affecting non safety classified SSCs could generate a PIE	X				
ENISS	9	3	6	Possible combinations of internal–internal and internal–external hazards and the ~~secondary/~~ cascading effects should be identified (for example, high energy pipe break, spray, pipe whip). The effects… general plant design.	Be more general talking about cascading effects or define the difference between the two terms and be consistent with Appendix 1.		X		Definitions of secondary effects and cascading effects will be provided.	75, same as FR85 and UK70
France - IRSN	15	3	7	3.7. The list of the combined hazards that should be considered in the design should be developed and the screening should be justified. Hazard combination should consider both dependent events, ie. consequential hazards induced by an initiating hazard, and credible independent hazards occurring simultaneously. See Appendix 1 for further development.	Hazard combination is always an ambiguous concept, it is better to clearly specify the intended scope		X with modification 3.7. The list of the combined hazards that should be considered in the design should be developed and the screening should be justified (see Appendix I).		Concise formulation by reference to Appendix I.	
Germany	10	3	7	Any ~~The list of the combined~~ combination of hazards ~~that~~ should be considered in the design. ~~should be developed and~~ The screening out of combinations should be justified.	Screening does not automatically include all combinations. The former formulation allows screening out or dropping of combinations without provision of a justification.		X Any credible combination of hazards should be considered in the design. The screening out of combinations should be justified.		Only credible combinations are considered in the design	
UK	9 (Framatone)	3	7	3.7. The list of the combined hazards that should be considered in the design should be developed and the screening should be justified. Hazard combinations should consider both dependent events, ie. consequential hazards induced by an initiating hazard, and credible independent hazards occurring simultaneously. See Appendix 1 for further details."	"Hazard combination is always an ambiguous concept, it is better to clearly specify the intended scope" ONR agrees with the comment as additional detail in the main body of the text, and slightly reworded the proposed text		X with modification 3.7. The list of the combined hazards that should be considered in the design should be developed and the screening should be justified (see Appendix I).		This integrated formulation answers also to other comments.	76, same as FR86 and UK71
WNA	15	3	7	3.7. The list of the combined hazards that should be considered in the design should be developed and the screening should be justified. Hazard combination should consider both dependent events, ie. consequential hazards induced by an initiating hazard, and credible independent hazards occurring simultaneously. See Appendix 1 for further development.	Hazard combination is always an ambiguous concept, it is better to clearly specify the intended scope		X with modification 3.7. The list of the combined hazards that should be considered in the design should be developed and the screening should be justified (see Appendix I).		Integrated resolution of similar comments.	
China	17	3	8	What does bounding assumptions mean? Please give more detailed guidance about this.				X	The recommendation is sufficiently clear and bounding means considering the worst case in terms of likelihood and consequences. A bounding analysis produces the worst case outcome in terms of the likelihood and/or frequency of a hazard. A conservative analysis does not generate the worst case result but does produce an outcome more severe than what would be expected from a best-estimate analysis. For example, a bounding analysis might assume that a target is destroyed any time it is struck by a missile. A conservative analysis would make pessimistic assumptions (e.g., the missile is in the most limiting orientation, 100% of its kinetic energy is transferred to the target, etc) but would allow for the possibility that the target survives the impact.	
Germany	11	3	8	As stated earlier, the identification of hazards includes assumptions about their characteristics. Bounding or conservative assumptions could be made about these characteristics in order to address uncertainty but these assumptions should be justified.	Without justification no rationale has to be provided that the assumptions made are bounding or conservative.		X As stated earlier, the identification of hazards includes assumptions about their characteristics. Bounding or conservative assumptions could be made about these characteristics in order to address uncertainty provided these assumptions are justified.		Better formulation	
France - IRSN	16	3	9	The design basis for items important to safety should specify the necessary capability, reliability and functionality for conditions arising from internal hazards ~~that~~ to the extent they need to withstand. The relevant internal hazards should be identified, and effects and environmental conditions created by these hazards have to be defined for the design and layout of the plant.	It should be set out that items important to safety might necessarily resist against an internal hazard at all or to a certain extent. The paragraph gives the impression that items important to safety have to resist to internal hazards at all. It is not true for "fire" as the systems are separated from each other but don't resist against fire (see 4.32 *.."the functional failure of all systems important to safety within the fire compartment or the fire cell in which the fire is postulated should be assumed,* "..)			X	This comment is not anymore applicable due to the quotation following Japan's comment No. 5.	
Germany	12	3	9	The design basis for items important to safety should specify the necessary capability, reliability and functionality for conditions arising from internal hazards that they need to withstand or that they are to be protected against.	Often the item important to safety does not withstand itself but is protected against the impact of a hazard (e.g. fire or load drop).	X				

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Japan	5	3	9	On the basis of Requirement 14 of Ref.[1], that "The design basis for items important to safety should specify the necessary capability, reliability and functionality ... for conditions arising from internal hazards …", ~~that they need to withstand. The~~ the relevant internal hazards should be identified, and effects and environmental conditions created by these hazards ~~have to~~ should be defined for the design and layout of the plant.	Clarification. The first sentence comes from Requirement 14 of Ref. [1], and then suggested relation of this paragraph to be clearly stated.		X Requirement 14 of Ref. [1] requires that "the design basis for items important to safety shall specify the necessary capability, reliability and functionality for conditions arising from internal hazards that they need to withstand". Therefore, the relevant internal hazards should be identified, and effects and environmental conditions created by these hazards have to be defined for the design and layout of the plant.		Better formulation. The resolution is combined with Germany comment No. 12.	
UK	10 (Framatone)	3	9	The design basis for items important to safety should specify the necessary capability, reliability and functionality for conditions arising from internal hazards to the extent they need to withstand. The relevant internal hazards should be identified, and effects and environmental conditions created by these hazards have to be defined for the design and layout of the plant.	*"It should be set out that items important to safety might necessarily resist against an internal hazard at all or to a certain extent. The paragraph gives the impression that items important to safety have to resist to internal hazards at all. It is not true for "fire" as the systems are separated from each other but don't resist against fire (see 4.32."the functional failure of all systems important to safety within the fire compartment or the fire cell in which the fire is postulated should be assumed,"..)"*			X	This comment is not anymore applicable due to the quotation following Japan's comment No. 5.	
WNA	16	3	9	The design basis for items important to safety should specify the necessary capability, reliability and functionality for conditions arising from internal hazards ~~that~~ to the extent they need to withstand. The relevant internal hazards should be identified, and effects and environmental conditions created by these hazards have to be defined for the design and layout of the plant.	It should be set out that items important to safety might necessarily resist against an internal hazard at all or to a certain extent. The paragraph gives the impression that items important to safety have to resist to internal hazards at all. It is not true for "fire" as the systems are separated from each other but don't resist against fire (see 4.32 .. *"the functional failure of all systems important to safety within the fire compartment or the fire cell in which the fire is postulated should be assumed,"*..)			X	Please note that the comment is not anymore applicable due to the quotation of Requirement 14 of SSR-2/1 (Rev.1).	
France - IRSN	22	3	10	*Prevention of the hazards and the effects of the hazards*	Prevention of the internal hazard must be first considered and analyzed.	X				
Germany	13	3	10	More details on hazard combinations are provided in Appendix I. The following recommendations also apply, as appropriate, to the internal hazard resulting from the combinations.	Clarification: The following applies to single internal hazards as well as to their combinations.	X				
UK	15 (Framatone)	3	10	*Prevention of the hazards and the effects of the hazards*	*"Prevention of the internal hazard must be first considered and analyzed."*	X				
WNA	22	3	10	*Prevention of the hazards and the effects of the hazards*	Prevention of the internal hazard must be first considered and analyzed.	X				25, (same as FR26 and UK19)
France - IRSN	17	3	11	3.11 A few hazards may be ~~eliminated~~ screened out either because they are physically impossible (e.g. heavy load drop if there is no lifting equipment) or by a stringent justification including at a the bare minimum very high quality design, manufacturing, construction, in-service inspection, experience feedback ~~(e.g. double ended guillotine break if the pipe is designed, monitored, inspected and maintained in such a way that failure or degraded conditions in service can be discounted)~~.	The word "eliminated" may be misleading as the discussions related to "practical elimination" in others contexts showed. "high quality design" is not sufficient. There should be strong justifications including a lot of aspects (in-sevice inspections, experience feedback…) that cannot be summarized in a simple bullet. In this context, giving an example is not relevant, tricky and provide no guidance whilst it may be understood as if such a justification is straightforword		X		Improved formulation.	
UK	11 (BAE)	3	11	a few hazards may be eliminated by redesign in concept stage, or because they are physically impossible…	*"The design is fluid and should be changed to eliminate hazards where possible. The earlier this takes place, typically the better." eliminated"* ONR added "When hazards cannot be to the start of para. 3.12.	X		X	The proposal is not clear. To add 'When hazards cannot be eliminated' accepted at the beginning of para. 3.12.	
France - IRSN	18	3	12	… on SSCs which failure could have an impact on safety. …	For safety purpose, not all SSCs need to be considered.		X …on SSCs important to safety		More concise formulation.	
Germany	1	3	12	*The document should include a set of conditions regarding the acceptance of administrative measures in the design. (quality, verification etc). In case that there are such kind of criteria published in other appropriate IAEA documents it would be sufficient to provide a reference in the DS 494*	Generic aspect: In several paras "administrative measures" were mentioned as possible prevention measures. The document includes no criteria regarding the acceptance of administrative measures when used to demonstrate a design condition.					
WNA	17	3	12	… on SSCs which failure could have an impact on safety. …	For safety purpose, not all SSCs need to be considered.		X When hazards cannot be eliminated, measures, including administrative ones, should be implemented to reduce the frequency and potential magnitude of the hazards and their effects on SSCs important to safety.		Integrated resolution of similar comments.	26, (same as FR27 and UK20)
Mexico	3	3	13	In general, the mitigation should also include specific measures for the detection of the occurrence of the respective hazard.	This action is not clear, because the paragraph mentions that mitigation actions are taking into account detection actions, when the document has its own detection actions parted.			X	Sorry, the text in the reason box is not clear.	
Russia - Rostechnadzor	3	3	14	classified in accordance with IAEA Specific Safety Guide SSG-30 [6] or relevant national classification in terms of safety.	It's also necessary to take into account national standards			X	In the context of IAEA safety standards, SSG-30 is supposed to be a consensus safety standard to which reference should be made. No need to mention national standard.	
WNA	18	3	14	Either delete 3.14 or mention all the relevant factors which should be considered when affecting safety classification to protective design features (e.g. frequency, time available …)	Other factors are indicated in SSG-30			X	Please note that para. 3.14 is stating that the safety classification should be according the recommendations of SSG-30.	
France - IRSN	19	3	15	…are generally considered to be preferable compared to the implementation of active measures or procedures.	Editorial			X	Preference implies comparison	
WNA	19	3	15	…are generally considered to be preferable compared to the implementation of active measures or procedures.	Editorial			X	Preference implies comparaison	
Finland	3	3	16	For active protective features, when applicable, the worst single failure should be assumed.	clarity; Make a sentence.	X				

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
France - IRSN	20	3	16	3.16. Active protective features can be used. ~~When applicable,~~ It is recommended that the worst single failure should be assumed for these active protective features.	"When applicable" is ambiguous as nobody knows when it is applicable. If IAEA considers that SFC should be applied it is better to recommend it. ~~A footnote may be added to mention that some member states do not consider it.~~		X For active protective features, when applicable, the worst single failure should be assumed.		See resolution of the Finnish comment No. 3.	14, partly like FR14
Germany	14	3	16	Active protective features can be used. When applicable, the worst single failure of these active protective features should be assumed ~~for these active protective features~~.	Avoid misunderstanding: it is not the worst single failure of an SSC initiating an internal hazard that should be assumed, but a single failure of the active protection features.		X For active protective features, when applicable, the worst single failure should be assumed.		See better formulation proposed by Finland.	
UK	12 (BAE)	3	16	3.16. Active protective features can be used. ~~When applicable,~~ It is recommended that the worst single failure should be assumed for these active protective features.	*"When applicable" is ambiguous as nobody knows when it is applicable. If IAEA considers that SFC should be applied it is better to recommend it. A footnote may be added to mention that some member states do not consider it.*		X For active protective features, when applicable, the worst single failure should be assumed.		Better formulation, compatible with other proposals, including the Finnish proposal.	
WNA	20	3	16	3.16. Active protective features can be used. ~~When applicable,~~ It is recommended that the worst single failure should be assumed for these active protective features.	"When applicable" is ambiguous as nobody knows when it is applicable. If IAEA considers that SFC should be applied it is better to recommend it. A footnote may be added to mention that some member states do not consider it.		X For active protective features, when applicable, the worst single failure should be assumed.		Integrated resolution of similar comments.	
Germany	15	3	17	The consideration of failure of a passive protective feature ~~component~~ is not necessary, provided that it is justified that its failure is very unlikely with a high degree of confidence.	"Component" appears misleading; use analogous wording to "active protective feature".		X The consideration of failure of a passive protective feature is not necessary, provided that it is justified that its failure is very unlikely with a high level of confidence.		Better formulation: degree changed in level.	
Iran	2	3	17	~~The consideration of failure of a passive component is not necessary provided that it is justified that its failure is very unlikely.~~ The paragraph should be removed.	The statement is related of screening of hazards. The same can be said about active components having very low probability of failure. Then, the paragraph is about a subject that is already evident.			X	The paragraph is related to the application of single failure to passive component of protective feature, and not to the screening of hazards.	15, same as FR15 and UK9
Iran	3	3	17	The consideration of failure of some passive component is not necessary,...	The word "some" added. Because some passive components, such as check valves, may have significant potential failures.			X	See resolution of previous comment.	
France - IRSN	21	3	18	If it is feasible, the early detection of the occurrence of internal hazards contributes to mitigation of the possible consequences	The word contribute to seems more appropriate than effective mesure	X				
UK	13 (Framatone)	3	18	If it is possible, the early detection of the occurrence of internal hazards with appropriate related actions is an effective measure for mitigation of the possible consequences.	*"The lonely detection is not sufficient for mitigation."*		X If it is possible, the early detection of the occurrence of internal hazards, asociated with appropriate related actions, is an effective measure for mitigation of the possible consequences		More precise wording.	
UK	14 (BAE)	3	18		*Detection is never an effective means mitigating a hazard in isolation. But early detection allows more grace-time in mounting an effective response .*		X		The comment is not well understood since para. 3.18 includes 'early detection'. See resolution of comment No. 13.	
UK	16 (BAE)	3	18		*"Detection is never an effective means mitigating a hazard in isolation. But early detection allows more grace-time in mounting an effective response."*		X		See comment No. 14.	
WNA	21	3	18	If it is possible, the early detection of the occurrence of internal hazards with appropriate related actions is an effective measure for mitigation of the possible consequences.	The lonely detection is not sufficient for mitigation.		X If it is possible, the early detection of the occurrence of internal hazards, asociated with appropriate related actions, is an effective measure for mitigation of the possible consequences		More precise wording	
France - IRSN	23	3	19	…(c) Barriers, by creating ~~R~~rooms and compartments, separating the high-energy systems~~by barriers~~, or forming of fire compartments or fire cells;	Original paragraph gives the impression that risks aligned to high-energy systems are confined by the use of fire barriers.		X Rooms and compartments, separating them for example into fire compartments or fire cells;		Better wording.	
Mexico	4	3	19	Cliff-edge effects. Under DEC	Is necessary more information about these terms.			X	Please consider that cliff edge effect is defined in both the IAEA safety glossary and SSR-2/1 (Rev.1) as "A 'cliff edge effect', in a nuclear power plant, is an instance of severely abnormal plant behaviour caused by an abrupt transition from one plant status to another following a	
UK	17 (Framatone)	3	19	…(c) Rooms and compartments enclosed by barriers, for example fire compartments or fire cells;	*"Original paragraph gives the impression that risks aligned to high-energy systems are confined by the use of fire barriers."* ONR modified the proposed text change		X Rooms and compartments, separating them for example into fire compartments or fire cells;			
WNA	23	3	19	…(c) Barriers, by creating ~~R~~rooms and compartments, separating the high-energy systems ~~by barriers~~, or forming of fire compartments or fire cells;	Original paragraph gives the impression that risks aligned to high-energy systems are confined by the use of fire barriers.		X Rooms and compartments, separating them for example into fire compartments or fire cells;		Better wording	
France - IRSN	24	3	21	~~3.21. The reliability of internal hazards detection and mitigation means should be consistent with their role in providing defence-in-depth.~~	This article provides no guidance and the link with DiD is not clear. Consider deletion or a simple sentence like "*3.21. The reliability of internal hazards detection and mitigation means should be consistent with their role in safety*".			X	Regarding the link with DiD, please refer to para. 2.10.	
Iran	4	3	21	The reliability of internal hazards detection and mitigation means should be consistent with their role in providing defence-in-depth. In other words, their reliabilities should be equal, as a minimum, or greater than the reliability of the defence-in-depth layer in which they are incorporated.	It should be clarified what the term "reliability consistency" refers to.			X	The explanation is given in the same paragraph.	
Japan	6	3	23	An assessment ~~is required to~~ should be made to demonstrate that those internal hazards relevant to the design of the nuclear power plant are considered, …	Editorial. Expression suitable to a guide document.	X				

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
USA	6	3	23	At the end of the Paragraph repeat the definition of "cliff edge effect" provided in SSG-2/1, Safety of Nuclear Power Plants: Design, or provide a direct reference to SSG-2/1 as the source of the definition.	It is important to maintain a single clear definition.			X	Please consider that cliff edge effect is defined in both the IAEA safety glossary and SSR-2/1 (Rev.1) as "A 'cliff edge effect', in a nuclear power plant, is an instance of severely abnormal plant behaviour caused by an abrupt transition from one plant status to another following a small deviation in a plant parameter, and thus a sudden large variation in plant conditions in response to a small variation in an input. " is added. This terminology has been used in many safety guides without the need for further definition.	
Finland	4	3	24	… ~~If that cannot be achieved, the designer should justify that the boundary conditions of the analysis of the corresponding accident are not affected by the loads resulting from the internal hazard~~."	A single internal hazard should not initiate a DEC with core melt. 3.24. is confusing. Delete last sentence. : "If that cannot be achieved, the designer should justify that the boundary conditions of the analysis of the corresponding accident are not affected by the loads resulting from the internal hazard."			X	Please note that the sentence 'If that cannot be achieved, the designer should justify that the boundary conditions of the analysis of the corresponding accident are not affected by the loads resulting from the internal hazard.' Is related to the first one: It should be a goal of the design that a single internal hazard does not trigger an accident, unless it can be considered by itself as a postulated accident (pipe rupture for instance).'. It is clear from the paragraph that a single internal hazards needs not to lead to a DEC with core melting.	
Germany	16	3	24	It should be a goal of the design that a single internal hazard does not trigger an accident, unless it can be considered by itself as a postulated accident (pipe rupture for instance). In particular, the design should ensure with a high level of confidence that a single internal hazard does not result in DEC with core melting. If that cannot be achieved, ~~the designer should justify that the boundary conditions of the analysis of the corresponding accident are not affected by the loads resulting from the internal hazard~~. it should be demonstrated by using the corresponding rules [7] that the boundary conditions, in particular the systems credited in the analysis of the corresponding accident, are not affected by the considered internal hazard. In practice, it should be demonstrated that the SSCs necessary to maintain the containment integrity are not affected by the hazard.	Unclear wording. Wording analogue to 3.31 may be used.			X	Please note that the sentence 'If that cannot be achieved, the designer should justify that the boundary conditions of the analysis of the corresponding accident are not affected by the loads resulting from the internal hazard' is related to the first sentence, i.e. 'It should be a goal of the design that a single internal hazard does not trigger an accident, unless it can be considered by itself as a postulated accident (pipe rupture for instance)' and not to the second sentence ' In particular, the design should ensure with a high level of confidence that a single internal hazard does not result in DEC with core melting'.	
Germany	17	3	25	The design features protecting the SSCs that are intended to be used under DECs should be designed or verified for the loads, conditions and durations necessary in these scenarios (e.g. effects of hydrogen combustion). Best estimate design loads, conditions and durations of DEC can be used for the design or the verification of these protective features and ~~These design features~~ should be protected against the consequences of an internal hazard occurring before DEC has been completely mitigated [2]. ~~Best estimate design loads, conditions and durations can be used for the design or the verification of these protective features.~~ [2] In some Member States, an independent fire is postulated to break out at least two weeks after DEC	The meaning and intention of this statement is not clear. We suggest some changes in text.			X	Best estimate design loads… cannot be protected against the consequences of an internal hazard.	
Japan	7	3	25	~~In some Member States, an independent fire is postulated to break out at least two weeks after DEC~~	This practice looks very specific one and maybe confusing without any background and conditions. Should be deleted, or add some explanation on its rationale.	X				
Poland	4	3	27	3.27. Internal hazards considered in the deterministic safety analyses, for a specified location in the NPP, could include the following categories: − Internal hazards neither triggering an AOO or an accident, nor resulting from an AOO or an accident; − Internal hazards that could trigger or result from an AOO; − Internal hazards that could trigger or result from a design basis accident (DBA); − Internal hazards that could either result in (or arise from) DEC without significant fuel degradation; − Internal hazards resulting from DEC with core melting.	The understanding of the following bullet is confusing: "Internal hazards that could either result in (or arise from) DEC without significant fuel degradation;" It would be more clear if the bullet is rewritten in the following form: "Internal hazards that could ~~either result in (or arise from)~~ **trigger or result from a** DEC without significant fuel degradation;			X	The formulation of the 4th bullet is clear and is similar to the 3rd one.	
China	43	3	28	FROM: "In practice, a functional analysis is necessary to demonstrate that enough redundant systems remain available to reach and maintain a safe shutdown state." TO: "In practice, a functional analysis is necessary to demonstrate that one train of redundant systems, at least, remains available to reach and maintain a safe shutdown state."	The redundant safely systems need not action in normal operation, so it is acceptable if the redundancy is affected.			X	Please note that It is not clear whether the comment takes into account both single failure and preventive maintenance. To think of and combine this comment with ENISS comment No. 10.	
ENISS	10	3	28	3.28. In the case of an internal hazard neither triggering an AOO or an accident – nor resulting from an AOO or an accident – the assessment should demonstrate that the plant can be brought to, and maintained in, a safe shutdown state in spite of a single failure and, if allowed, in spite of equipment unavailability due to preventive maintenance. ~~In practice, a functional analysis is necessary to demonstrate that enough redundant systems remain available to reach and maintain a safe shutdown state.~~	A functional analysis is not systematically necessary for internal hazards assessment (in particular, if they neither trigger nor result from AOOs or accidents).		X		Keep the last sentence as" In practice, a functional analysis is normally performed to demonstrate…a safe shutdown state".	
Iran	5	3	28	be brought to, and maintained in, a safe operation state or a safe shutdown state in spite...	It may not be necessary to shut down. Shut down should be considered as the last option.		X		Safe shutdown state is changed everywhere in 'safe state' in compliance with SSR-2/1 (Rev.1) terminology.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Belgium	1	3	29	"The assessment of internal hazards that could trigger an AOO **or result from an AOO** should be performed to demonstrate that …"	In order to be consistent with para 3.27, 3.28 and 3.30	X				
France - IRSN	25	3	29	However, a specific transient analysis is normally not necessary as ….	Consistency with comment n°8 on 2.12(c)	X				
UK	18 (Famatone)	3	29	However, a specific transient analysis is normally not necessary as ….	Consistency with comment n°8 on 2.12(c)	X				
WNA	24	3	29	However, a specific transient analysis is normally not necessary as ….	Consistency with comment n°8 on 2.12(c)	X				
China	44	3	30	FROM: 'in particular the systems credited in the accident analysis, are not affected by the considered internal hazard" TO: "in particular the safely functions credited in the accident analysis, are not affected by the considered internal hazard"	The application of SFC should be considered case by case, for DBA or DEC-A condition and design redundancy (N+I or N+2), so change the "systems" to "function" is more suitable.			X	Please note that the reason and the proposed formulation are confusing as single failure criterion is not applied for DEC without significant fuel degradation.	
ENISS	11	3	30	3.30. For internal hazards ~~leading to, or~~ resulting from accidents without significant fuel degradation, the objective of the assessment should be to demonstrate that the boundary conditions, in particular the systems credited in the accident analysis, are not affected by the considered internal hazard. A specific accident analysis is not necessary as this is provided by the corresponding accident analysis in which the rules for DBA or the rules for DEC without significant fuel degradation [7] should be applied as appropriate. According to 2.13, DBA or DEC induced by internal hazards should be avoided to the extent reasonably practicable. Should an internal hazard lead to accidents without significant fuel degradation, the objective of the assessment should be to demonstrate that the fundamental safety functions are fulfilled and that the plant can be brought to and maintained in a safe shutdown state.	The analysis for the two cases (leading to / resulting) do not need to be treated the same way to be able to meet the safety objectives: To make this clear and avoid potential confusion, the two cases have been separated.		X		A new para. is added as " According to para. 2.13, design basis accidents or design extension conditions induced by internal hazards should be avoided to the extent reasonably practicable. Should an internal hazard lead to accidents without significant fuel degradation, the objective of the assessment should be to demonstrate that the fundamental safety functions are fulfilled and that the plant can be brought to and maintained in a safe state."	
France - IRSN	26	3	30	… A specific accident analysis is normally not necessary …	Consistency with 2.12(c) In specific cases, considering SSCs with lower safety classification in the safety demonstration may be justified.	X				
UK	19 (Framatone)	3	30	… A specific accident analysis is normally not necessary …	Consistency with 2.12(c) In specific cases, considering SSCs with lower safety classification in the safety demonstration may be justified.	X				
WNA	25	3	30	… A specific accident analysis is normally not necessary …	Consistency with 2.12(c) In specific cases, considering SSCs with lower safety classification in the safety demonstration may be justified.	X				
China	45	3	31	FROM: "in particular the systems credited in the accident analysis, are not affected by the considered internal hazard" TO: "in particular the safely functions credited in the accident analysis, are not affected by the considered internal hazard"	Similar reason with comment No.2.			X	The reason is confusing. Please refer to the previous comment.	
Finland	5	3	31	… In practice, it should be demonstrated that the SSCs necessary to maintain the containment integrity are not affected by the hazard. *The integrity of necessary measurements should be ensured.*	clarity; Add; . *The integrity of necessary measurements should be ensured.* It is not clear whether important measurements are covered by the proposed paragraph.		X In particular, the integrity of instrumentation providing necessary measurements should be ensured.		Better wording	
France - IRSN	27	3	31	Reference [7] will soon be superseded by DS491 (SSG-2 revision 1)				X	DS491 is not yet published.	
UK	20 (Framatone)	3	31		Reference [7] will soon be superseded by DS491 (SSG-2 revision 1)			X	DS491 is not yet published.	
WNA	26	3	31	Reference [7] will soon be superseded by DS491 (SSG-2 revision 1)				X	DS491 is not yet published.	
Finland	6	3	32	In the whole life cycle from construction to decommissioning of a multiple unit and/or multi-source power plant, steps should be taken to ensure that an internal hazard in a unit and/or radioactive source under construction or in operation would not have any safety consequences for a neighbouring operating unit or radioactive source (e.g. spent fuel pool). Temporary separations should be used if necessary to protect the operating units.	clarity, add radioactive source (e.g. spent fuel pool) Is multi-source power plant clear ?		X In the whole life cycle from construction to decommissioning of a multiple unit and/or multiple radioactive source site, steps should be taken to ensure that an internal hazard in a unit and/or radioactive source under construction or in operation would not have any safety consequences for a neighbouring operating unit or radioactive source (e.g. spent fuel pool). Temporary separations should be used if necessary to protect the operating units.		Better wording	
Germany	18	3	32	In the whole life cycle from construction to decommissioning of a multiple unit and/or multi-source ~~power plant~~ site, steps should be taken to ensure that an internal hazard in a unit and/or radioactive source under construction or in operation would not have any safety consequences for a neighbouring operating unit or source (e.g. spent fuel pool). Temporary separations should be used if necessary to protect the operating units. Consideration should be given to the possibility of internal hazards involving facilities shared between units (para. 5.63 of Ref. [1]).	Although this guide is intended for the design of NPPs, activities in units and/or radioactive sources under decommissioning can result in internal hazards. A reference and clear interface for the prevention and mitigation of internal hazards resulting from decommissioning activities or affecting units and/or radioactive sources under decommissioning may be provided. The last sentence should be moved from 3.33 into this section.	X				
ENISS	12	3	33	3.33. The main control rooms should be adequately separated from possible sources of internal hazards as far as applicable. Consideration should be given to the possibility of internal hazards involving facilities shared between units (para. 5.63 of Ref. [1]). The means by which the control is transferred from the main control room to the supplementary control room should be resilient against internal hazards to prevent malfunction or spurious actuation.	The last sentence is not specific to fire protection and has been moved here from §4.50.	X				

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Germany	19	3	33	The main control rooms should be adequately separated from possible sources of internal hazards as far as applicable. ~~Consideration should be given to the possibility of internal hazards involving facilities shared between units (para. 5.63 of Ref. [1]).~~	The last sentence should be moved into a separate paragraph or as proposed into paragraph 3.32. See comment No. 7 above.	X				
Russia - Rosenergoatom	8	3	33	The main *and supplementary* control rooms should be adequately separated from possible sources of internal hazards as far as applicable	Supplementary control rooms should also be adequately protected.	X				
USA	5	3		In section 3. "General Design Recommendations", add the following as a new paragraph: "For I&C components or systems, the hazard control measures should be as simple as possible to facilitate activities such as inspections, configuration management, and fulfilling procedural requirements. In addition to inherent design features within the I&C component or system (e.g. independence, diversity), other hazard control measures such as mechanical controls and operational procedures should be considered. The evaluation or testing of hazard control measures should verify the effectiveness of each measure. Specifically, hazard controls should not prevent the I&C component or system from meeting its functional and performance requirements."	The proposed paragraph provides design recommendations associated with hazard controls for I&C equipment.			X	Please see answer to comment 3.	24, (same as FR25 and UK18)
France - IRSN	28	4	1	4.1. Nuclear power plants contain a range of combustible materials, as part of the structure, equipment, fluids, cabling or miscellaneous items in storage. Since fire can be assumed to occur in any plant area where combustible materials are present~~, and where it is not reasonably practicable to eliminate these,~~ design measures for fire prevention should be applied to all the fixed and transient fire loads.	The concept of elimination of fire is not clear and not consistent with the sentence itself			X	What is meant in 4.1 is elimination of combustible material and not elimination of fire.	
UK	21 (Framatone)	4	1	..Such measures include minimization of fire loads (fixed and transient), prevention of their accumulation or (preferably) elimination of sources of ignition.	*"To be more general. Transient combustible materials are considered as fire loads as well and even fixed fire loads will be accumulated during plant live time. In line with 4.5 (a)"*	X				
WNA	27	4	1	..Such measures include minimization of ~~fixed~~ fire loads (fixed and transient), prevention of their accumulation ~~of transient combustible materials and control~~ or (preferably) elimination of sources of ignition.	To be more general. Transient combustible materials are considered as fire loads as well and even fixed fire loads will be accumulated during plant live time. In line with 4.5 (a)		X Such measures include minimization of fixed fire loads, prevention of their accumulation and control or (preferably) elimination of sources of ignition.		In some cases, complete elimination of sources of ignition is not alwys feasible; therefore, control is still needed.	
France - IRSN	29	4	3	…In particular, the fire hazard analysis should determine the degree of separation, the necessary fire resistance rating of fire barriers and…	At first is shall be investigated if there is correct and sufficient separation, than the performance (fire resistance) of the separating barrier if the fire confinement approach is used.			X	Introducing 'separation' in this para. disturbes the flow of the text; "segregation and separation" are introduced later in the text.	
WNA	28	4	3	…In particular, the fire hazard analysis should determine the degree of separation, the necessary fire resistance rating of fire barriers and…	At first is shall be investigated if there is correct and sufficient separation, than the performance (fire resistance) of the separating barrier if the fire confinement approach is used.			X	Introducing 'separation' in this para. disturbes the flow of the text; "segregation and separation" are introduced later in the text.	
China	46	4	4	FROM: "The fire hazard analysis should be carried out earl in the design phase and documented. It should i.e updated before initial loading of the reactor fuel and kept up to date during plant operation." TO: "The fire hazard analysis should be carried out before initial loading of the reactor fuel and kept up to date during plant operation."	Because it is not so clear for the date on "early in the design phase", and it is so difficult to collect input data for fire hazard analysis at early design phase, as equipment with fire hazard are not purchased yet at this phase.			X	Please note that para. 4.4 is considering 2 steps: preliminary fire hazard analysis and then an updated fire hazard analysis before initial fuel loading.	
France - IRSN	30	4	4	The ~~fire~~ hazard analysis should be carried out early in the design phase and documented. It should be updated before initial loading of the reactor fuel and kept up to date during plant operation.	Not specific to internal fire. Consider having this paragraph in chapter "GENERAL DESIGN RECOMMENDATIONS"		X		The paragraph has been moved at the end of para. 3.23.	
France - IRSN	31	4	5	…. (a) Removal, minimization proper material selection and segregation of fixed and transient (temporary) fire loads as far as reasonably practicable;	To be in line with items described in sub-title "Minimize fire loads"			X	It is also mentioned as a way to minimize fire loads.	
UK	22 (BAE)	4	5		*"Containment of fire is also an important safety function. Materials control is also a measure that should be briefly mentioned here. Add new bullet (c) Segregation of ignition sources from fuel sources."* ONR considers that segregation of ignitions sources from fuel sources should be considered in paragraphs 4.11-4-15	X				
UK	23 (Framatone)	4	5	….(a) Removal, minimization, proper material selection and segregation of fixed and transient (temporary) fire loads as far as reasonably practicable;	To be in line with items described in sub-title "Minimize fire loads"			X	It is also mentioned as a way to minimize fire loads.	
WNA	29	4	5	…. (a) Removal, minimization proper material selection and segregation of fixed and transient (temporary) fire loads as far as reasonably practicable;	To be in line with items described in sub-title "Minimize fire loads"			X	It is also mentioned as a way to minimize fire loads.	
France - IRSN	32	4	6	In order to reduce the fire load to the extent possible ~~and~~ thus minimizing the fire hazard, the following aspects should be notably considered in the plant design:	The term "hazard" is aligned to a risk approach which is a relationship between a possibility of a fire and its potential damage with its likelihood of occurrence (presence of ignition source). "minimize fire loads" cannot exclusively mentioned in 4.6. under the title as the ignition source is needed for the risk approach as well. The propose modification describes that the minimization of fire loads is one variable influencing the fire hazard.		X In order to reduce the fire load to the extent possible ~~and~~ thus minimizing the fire hazard, the following aspects should be considered in the plant design:		No need to emphasize those aspects.	
France - IRSN	33	4	6	.. The use of air filters and filter frames of non-combustible ~~or low combustible construction~~materials as far as reasonably practicable;	To be in line with 4.6. (a). 4.6.(b) does not differ between the use of non-combustible material and low combustible construction materials. It considers both types of material as equivalent by using "or". There is however an order of priority in the material selection.		X The use of air filters and filter frames of non-combustible materials as far as reasonably practicable; otherwise low combustible materials could be used.		DS494 consistent with NS-G-1.7	
France - IRSN	34	4	6	…. The use of design features preventing flammable liquids from spreading towards large areas, for example ~~a~~ protected pipe or double pipe design for lubricating oil lines and collection of leakages and dyked areas;	It is more a measure to: 1) prevent a fire load to spread to it's potential ignition source, and 2) to limit the fire size by limiting the flammable surface. Eventually it is a separate paragraph similar as 4.10			X	Covered in 4.10; no added value in 4.6 (c)	
France - IRSN	35	4	6	Segregation and compartmentation of fire loads as far as reasonably practicable to reduce the likelihood of fire and other effects spreading to other SSCs important to safety. Volume compartmentation also allows easier intervention.				X	The subject of this sub-section is fire minimization and not the mitigation.	63, same as FR60 and UK53
Germany	20	4	6	b) The use of air filters and filter frames of non-combustible ~~or low combustible~~ construction materials as far as reasonably practicable.	This para. considers non-combustible material and low combustible materials as equivalent by using "or". There is however an order of priority in the material selection.		X The use of air filters and filter frames of non-combustible as far as reasonably practicable; otherwise low combustible materials could be used		More precise and complete formulation.	
Germany	21	4	6	f) The use of non-combustible materials in electrical equipment such as switches and circuit breakers, and in control and instrumentation cubicles; *Please add recommendations for the minimization of cable fire loads or cable flammability are to be added, e.g. by the requirement to use FRNC cables or cables with certain qualifications.*	Protection against electrical cable fires has to be mentioned in 4.6 before it is deepened in II.26		X The use of non-combustible materials in electrical equipment such as switches and circuit breakers, and in control and instrumentation cubicles, and use of flame retardant non-corrosive cables or cables with certain qualifications;			
Iran	6	4	6	Adding items such as: i) The use of fire-proof doors, that open outwards during emergency situations. j) The installation of the indicators to show emergency exit path in all corridors. k) The installation of warning signs on all places containing combustible materials.	In order to prevent the release of fire and the possibility of escaping for people.			X	Items i) and j) are included in para. II.25. (Item k)	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Poland	5	4	6	i) Minimize the time of use of the necessary combustible, flammable and explosive materials.	It is necessary from time to time to use wooden transport pallets, technical gases or cleaning liquids like solvents. Reducing the residence time of these materials can significantly reduce the potential fire hazard.			X	This is in the scope of operation not for the design and should be addressed in the dedicated safety guide being prepared at the IAEA.	
UK	24 (Framatone)	4	6	In order to reduce the fire load to the extent possible thus minimizing the fire hazard, the following aspects should be considered in the plant design:	The term "hazard" is aligned to a risk approach which is a relationship between a possibility of a fire and its potential damage with its likelihood of occurrence (presence of ignition source). It cannot exclusively mentioned in 4.6. under the title "minimize fire loads" as the ignition source is needed for the risk approach as well. The propose modification describes that the minimization of fire loads is one variable influencing the fire hazard.	X				59, same as FR57 and UK51
UK	25 (Framatone)	4	6	The use of design features to control or limit the spread of flammable liquids for example by protecting pipes or implementing double pipe designs for lubricating oil lines, by collection of leakages within bunded;	*"It is more a measure to: 1) prevent a fire load to spread to it's potential ignition source, and 2) to limit the fire size by limiting the flammable surface. Eventually it is a separate paragraph similar as 4.10"* ONR edited the text to the proposed change			X	Covered in 4.10; no added value in 4.6 (c)	
WNA	30	4	6	In order to reduce the fire load to the extent possible ~~and~~ thus minimizing the fire hazard, the following aspects should be considered in the plant design:	The term "hazard" is aligned to a risk approach which is a relationship between a possibility of a fire and its potential damage with its likelihood of occurrence (presence of ignition source). It cannot exclusively mentioned in 4.6. under the title "minimize fire loads" as the ignition source is needed for the risk approach as well. The propose modification describes that the minimization of fire loads is one variable influencing the fire hazard.	X				
WNA	31	4	6	b) The use of air filters and filter frames of non-combustible ~~or low combustible construction~~ materials as far as reasonably practicable;	To be in line with 4.6. (a). 4.6.(b) does not differ between the use of non-combustible material and low combustible construction materials. It considers both types of material as equivalent by using "or". There is however an order of priority in the material selection.		X The use of air filters and filter frames of non-combustible materials as far as reasonably practicable; otherwise low combustible materials could be used.		Integrated resolution to take into account other similar comments.	29, (same as FR31 and UK23)
WNA	32	4	6	c) The use of design features preventing flammable liquids from spreading towards large areas, for example ~~a~~protected pipe or double pipe design for lubricating oil lines and collection of leakages and dyked areas;	It is more a measure to: 1) prevent a fire load to spread to it's potential ignition source, and 2) to limit the fire size by limiting the flammable surface. Eventually it is a separate paragraph similar as 4.10			X	Covered in 4.10; no added value in 4.6 (c)	
WNA	33	4	6	…. h) Segregation and compartmentation of fire loads as far as reasonably practicable to reduce the likelihood of fire on these fire loads ~~and other effects spreading to other SSCs important to safety~~.	It is more a protection feature to protect fire loads, in particular high fire load, from fires that may occur outside the respective fire compartment. It reduces the likelihood of fires on these (critical) fire loads. Comparable to comment made to 4.6. c). Here the protection feature is that the potential ignition source shall not reach it's fire load (other direction as in c)). Confine fire and therefore preventing of spreading to SSC important to safety is part of chapter "*Fire mitigation:"* h) might be even an new paragraph similar as 4.7. and 4.9. as dealing with a similar approach – preventing of fire spreading and protecting of combustible from being ignited.			X	The subject of this sub-section is fire minimization and not the mitigation.	60, same as UK52
Finland	7	4	7	Design measures should be implemented to provide for the proper storage of transient combustible materials that arise during operation; either ~~away~~ *apart* from the relevant items important to safety or otherwise protected	clarity; Please replace a word away with apart.	X				
UK	26 (BAE)	4	8	Additional text "…do not contain items important to safety, **or which could impact on safety, such as electrical supplies to essential plant."**	Self-explanatory.			X	The proposed text does not fit. What is essential plant?	
UK	27 (BAE)	4	9	…Flammable liquids (or gases)…	Flammable gases should be stored in this way to reduce the potential for pressure vessel burst.	X				
France - IRSN	36	4	10	Systems containing flammable liquids or gases should be designed with a high degree of integrity in order to prevent…	This paragraph is even valid for explosion protection, in particular for flammable gases. A similar paragraph needs to be included in Section "INTERNAL EXPLOSIONS". Here gases should be excluded as gases tend more to explode rather simply burn.			X	Gases will burn as a flash fire if confinement or congestion are absent.	
UK	28 (BAE)	4	10	Consideration should be given to passive protection of these systems against fire in circumstances where flame impingement could occur and give rise to hazardous conditions.	ONR considers that the comment can be included as additional text at the end of 4.10.			X	The proposal does not fit in para 4.10	
WNA	34	4	10	Systems containing flammable liquids ~~or gases~~ should be designed with a high degree of integrity in order to prevent…	This paragraph is even valid for explosion protection, in particular for flammable gases. A similar paragraph needs to be included in Section "INTERNAL EXPLOSIONS". Here gases should be excluded as gases tend more to explode rather simply burn.			X	Gases will burn as a flash fire if confinement or congestion are absent.	
ENISS	13	4	11	4.11. The number of ignition sources should be minimized in the design to the extent possible (e.g.: a resilient design of electrical protection system should be used).	The role of a well designed electrical protection system could be emphasized to minimize ignition sources (considering that >50% of fire starts are linked with electrical equipment (not only cables)).		X The number of ignition sources should be minimized in the design to the extent possible (e.g.: a resilient design of electrical protection system could be used).		Could because it is an example.	
WNA	35	4	11	4.11. The number of ignition sources should be minimized in the design to the extent ~~possible~~practicable.	Too strong because the presence of combustibles is already allowed and a risk approach is generally used. See also 4.14: *"..safe through design so as not to provide any ignition source as far as reasonably practical,".* It is furthermore questionable requiring a maximum in preventing ignition sources if a fire is already postulated (4.1.). This is also as the prevention if ignition sources is most challenging.	X				
Mexico	5	4	12	Precautions should be taken to prevent thermal insulating materials from absorbing flammable liquids (e.g. oil). Suitable protective coverings or drip guards should be provided... change to minimize fire loads.	This text provides a recommendation about the fire load not for source.	X				
UK	29 (BAE)	4	12	Also, spray guards on pressurized combustible liquid containing systems, such as hydraulic and lube oil should be provided as far as reasonably practicable.	To prevent the formation of ignitable mists and jet fires		X Spray guards on pressurized combustible liquid containing systems, such as hydraulic and lube oil should be provided as far as reasonably practicable.		More precise wording combining the objective and the corresponding design meassure	
UK	30 (BAE)	4	12	and equipment should be appropriately rated according to the hazards present in the environment, i.e. ATEX rating	Prevention of ignition sources for flammable gases and ignitable sprays.		X To prevent ignition sources for flammable gases and ignitable sprays, equipment should be appropriately rated according to the hazards present in the environment.		See previous comment	
France - IRSN	37	4	13	4.13. Potential ignition sources arising from plant systems and equipment should be controlled. For example…	An example may help as it is rather general.			X	Examples are not appropriate for this general paragraph. Nevertheless, potential examples could be the use of EX-rated motors, insulation on hot surfaces where oil leaks could fall.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Mexico	6	4	13	It is necessary to write an example, it means, what kind of ignition specific sources?	The current text is not it specific about the sources and systems			X	Please refer to para.4.14. There are many examples in it.	
UK	31(Framatone)	4	13	4.13. Potential ignition sources arising from plant systems and equipment should be controlled. For example…	An example may help as it is rather general.			X	Examples are not appropriate for this general paragraph. Nevertheless, potential examples could be the use of EX-rated motors, insulation on hot surfaces where oil leaks could fall.	
WNA	36	4	13	4.13. Potential ignition sources arising from plant systems and equipment should be controlled. For example…	An example may help as it is rather general.			X	Examples are not appropriate for this general paragraph. Nevertheless, potential examples could be the use of EX-rated motors, insulation on hot surfaces where oil leaks could fall.	
France - IRSN	38	4	14	…., separated from combustible materials, insulated or enclosed thus not constituting an ignition source.	Some explanation why this is an ignition source prevention measure.			X	Please refer to the beginning of the sentence.	
Iran	7	4	14	Systems and equipment should be made safe through design to provide each ignition source ...	Ignition sources should be separated from combustible materials.			X	This is already expressed in para. 4.14.	
Mexico	7	4	14	Equipment for dispensing flammable liquids or gases should be properly earthed	What does it mean? The earth is necessary by electricity, but it is not clear why this action is necessary in flammable cases. On the other hand, if the action is referring about a discharge liquid or gas to the earth or something like that, is necessary to complement the paragraph with the correct action.			X	Please refer to NS-G-1.7, para. 4.19.	
UK	32 (Framatone)	4	14	For example, electrical equipment should be selected and classified for the intended load factor …..	Occupancy condition is used quite seldom in this context.			X	Check in NS-G-1.7. Seems to be used there.	
USA	7	4	14	Remove the sentence: "For example, electrical equipment should be selected and classified for occupancy conditions."	It is not clear what is meant by "occupancy conditions." Occupancy typically refers to human occupancy, and this paragraph is about eliminating ignition sources.			X	Consistent with NS-G-1.7.	
WNA	37	4	14	…., separated from combustible materials, insulated or enclosed thus not constituting an ignition source.	Some explanation why this is a ignition source prevention measure.			X	Please refer to the beginning of the sentence.	
WNA	38	4	14	For example, electrical equipment should be selected and classified for ~~occupancy conditions~~the intended load factor …..	Occupancy condition is used quite seldom in this context.			X	The formulation is the same as in NS-G-1.7, para. 4.19.	
France - IRSN	39	4	15	Cables should be laid on trays or installed conduits, or placed in other acceptable structures made out of non-combustible materials: for example, steel is often used for this purpose. The distances between power cables or cable trays should be sufficient to prevent the cables from heating up to unacceptably high temperatures. The electrical protection system should be designed so that the cables will not overheat under normal loads or transient short circuit conditions [8, 9]. As far as possible, cable trays should be kept away from sources of ignition.	The lesson learned of OECD PRISME-2 program show that ignition of cable trays can lead to powerful fire.			X	This is not generic to cable trays.	
Russia - Rosatom	3	4	15		add the phrase "take into account the aging of electrical cable insulation."			X	Please consider that there is no comment and the reason is not clear.	
WNA	39	4	15	…. structures made out of non-combustible materials: for example, steel is often used for this purpose. ….	The use of non-combustible structures is not clear in this context. The prevention is ignition sources is more the prevention of overheating of the cables. The (non) fire load provided by the cable trays negligible compared to the cable insulation material.			X	The wording of the reason of the comment is not clear.	
ENISS	14	4	16	4.16. Fire detection and fire extinguishing means should be provided, with the necessary systems and equipment being defined by the fire hazard analysis. These systems and equipment should be designed to provide a timely alarm in the event of fire, and/or its speedy extinguishing in order to minimize the adverse effects on items important to safety and to plant personnel carrying out actions important to safety.	In order to be consistent with other paragraphs such as 4.200 & 4.202. Even though the licensee has to protect all the personnel, specific regulations apply as National Labor Acts. In the scope of IAEA Safety Standards, the demonstration covers the safety area.		X Fire detection and fire extinguishing means should be provided, with the necessary systems and equipment being defined by the fire hazard analysis. These systems and equipment should be designed to provide a timely alarm in the event of fire, and/or its rapid extinguishing in order to minimize the adverse effects on items important to safety and to plant personnel performing actions important to safety.		Better formulation	
Finland	8	4	16	*Fire mitigation: Quick detection and extinguishing of fires that do start*	Please reface: Quick detection is equally important.		X *Fire mitigation: Timely detection and extinguishing of fires*		Better formulation.	
Mexico	8	4	16	…equipment being defined by the fire hazard analysis… change to equipment well defined by the fire hazard analysis	In this case being is synonymous of well?			X	'being' is synonymous of 'that are'	
UK	33 (BAE)	4	16	Add "Fire detection, **suppression,** and fire extinguishing…"	Suppression systems can (in some instances) ensure that fire does not start by introducing inert gases etc into systems where raised heat levels have been detected. They can also ensure that a fire does not re-start after the initial fire-fighting (or fire suppression) efforts.	X				
Mexico	9	4	17	Active and passive fire protection means that need to maintain a functional capability (their integrity and/or their functional capability and/or their operability after a postulated initiating event) despite the effects of the postulated initiating event should be identified, adequately designed and qualified.	This recommendation looks like a prevention instead of mitigation.			X	Consistently with NS-G-1.7, it is in the mitigation part.	71, same as FR68 and UK62
UK	34 Framatone	4	17	~~4.17. Active and passive fire protection means that need to maintain a functional capability (their integrity and/or their functional capability and/or their operability after a postulated initiating event) despite the effects of the postulated initiating event should be identified, adequately designed and qualified.~~	Framatone noted that reference to PIE is misleading here, it may let think that fire is combined with independent PIE. Dependent PIE is covered by the general requirements 3.29 and 3.30. The protection of SSCs is addressed in 4.32 ONR considers that para 4.17 will benefit from further review. The text was provided to mean that the functional capability of the active and passive means need to be maintained. In either case, the features need to remain operational		X Active and passive fire protection means that need to maintain a functional capability (their integrity and/or their functional capability and/or their operability) to protect SSCs important to safety against a fire following another initiating event (e.g. an earthquake) should be identified, adequately designed and qualified to resist the effects of this initiating event.		Formulation consistent with NS-G-1.7	
WNA	40	4	17	~~4.17. Active and passive fire protection means that need to maintain a functional capability (their integrity and/or their functional capability and/or their operability after a postulated initiating event) despite the effects of the postulated initiating event should be identified, adequately designed and qualified.~~	Reference to PIE is misleading here, it may let think that fire is combined with independent PIE. Dependent PIE is covered by the general requirements 3.29 and 3.30. The protection of SSCs is addressed in 4.32		X Active and passive fire protection means that need to maintain a functional capability (their integrity and/or their functional capability and/or their operability) to protect SSCs important to safety against a fire following another initiating event (e.g. an earthquake) should be identified, adequately designed and qualified to resist the effects of this initiating event.		The paragraph is clarified by using a similar paragraph from NS-G-1.7.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Finland	10	4	19	Stationary (fixed) fire extinguishing systems should be automatically actuated where necessary, and systems should be designed and located so as to ensure that their rupture or spurious operation does not significantly impair the capability of SSCs important to safety to fulfill their required safety function, and does not simultaneously affect redundant parts of safety groups, thereby rendering ineffective the measures taken to meet the 'single failure' criterion	Please clarify and update to reflect the current SSR-2/1;. The last sentence is referring to the safety group. However the definition of the safety group does not consider DEC conditions! safety group ->SSC important to safety			X	This comment seems strange as SFC is not applied to DEC.	
France - IRSN	40	4	19	….. systems should be designed and located so as to ensure that their rupture or spurious operation does not significantly impair the capability of SSCs important to safety to fulfill their required safety function, and does not simultaneously affect redundant parts of safety ~~groups~~systems,thereby rendering ineffective the measures taken to meet the 'single failure' criterion.	Editorial			X	SFC can be applied to a group of systems. Moreover, safety system is more restrictive than a group.	
WNA	41	4	19	….. systems should be designed and located so as to ensure that their rupture or spurious operation does ~~not significantly impair the capability of SSCs important to safety to fulfill their required safety function, and does~~ not simultaneously affect redundant parts of safety ~~groups~~systems, ~~thereby rendering ineffective the measures taken to meet the 'single failure' criterion~~.	Not clear why the spurious operation shall already not significantly impair the capability within a single redundancy. This would e.g. result in water tight SSC important to safety. This however is contraire to the intended extinguishing function. That the fundamental safety function shall not be impaired is already mention in 4.21. (c). Most part of this paragraph are aligned to secondary effects but it should be kept at this location. Lasts sentence is only description and not needed in this section.			X	SFC can be applied to a group of systems.	
France - IRSN	41	4	20	Unless they are demonstrated as not necessary for the safety demonstration, …	In some designs, the fire detection systems and fire extinguishing systems are not necessary for the safety demonstration.			X	Already reflectedin "as far as practicable"	3 (same as FR4)
UK	35 (BAE)	4	20		BAE noted that it was not sure about having independent ventilation systems for different fire compartments. It may not improve reliability at the local level, would involve the use of separate fans and control circuitry (pushing up cost and increasing fire frequency at a plant level) and it is difficult to see how ventilation ducts could be engineered for so many separate systems. It is important that closure of ventilation to one compartment does not impair ventilation to other compartment, because electrical equipment often requires active cooling. ONR considers that the wording of the paragraph states "so far as practicable but can still be improved.			X	What is the comment?	4 (line 5) = FR4
UK	36 (Framatone)	4	20	….. counterparts in other safety divisions. The purpose of this is to maintain the operability of such systems in adjacent fire compartments.	Safety systems are typically routed through different fire compartments provided as mitigation measure. It is not necessary to separate detection systems and extinguishing systems between those fire compartments.			X	Consistency with NS-G-1.7	
WNA	42	4	20	Unless they are demonstrated as not necessary for the safety demonstration, …	In some designs, the fire detection systems and fire extinguishing systems are not necessary for the safety demonstration.			X	Already reflected in "as far as practicable"	
WNA	43	4	20	….. counterparts in other fire compartments containing a redundant part of a safety system. The purpose of this is to maintain the operability of such systems in these adjacent fire compartments.	Safety systems are typically routed through different fire compartments provided as mitigation measure. It is not necessary to separate detection systems and extinguishing systems between those fire compartments.			X	Note differences in Framatome proposal.	
France - IRSN	43	4	21	(c) The normal or the spurious operation of fire extinguishing systems should not inadmissibly impair the required safety functions. (d) The design and the operation of fire extinguishing systems or manual fire-fighting capabilities should be suitable for the nature of fire and should not induce other potential risks nor hazards (e.g. risk of criticality, risk of significant overpressure,...).				X	Please refer to II-97.	17 (similar comments; however, proposed texts slightly different)
France - IRSN		4	21	… as active elements of a fire compartment credited in the safety demonstration, …	Not necessary if the fire compartment is implemented only for investment protection.			X	Please refer to para 1.5. This guide is dedicated to safety and this addition is not needed.	
Mexico	10	4	21	When fire detection or extinguishing systems...	To write where does not have coherency in the idea.			X	Both expressions are OK. We kept the formulation from NS-G-1.7, para. 5.1.	
Mexico	11	4	21	When fire detection systems or fixed fire extinguishing...	To write where does not have coherency in the idea			X	Please refer to the previous comment.	
UK	37 (BAE)	4	21	periodic testing should be sufficiently stringent to ensure their permanent availability so far as reasonably practicable. Planned maintenance involving outage should take place when risk is low (i.e. in electrical compartments, when equipment is de-energized) or when the plant is shut down for periodic inspections."	This is difficult to achieve in reality. Testing will identify failures that must be corrected with system downtime. Also, system obsolescence will require replacement. It might be better to say that planned maintenance involving outage should take place when risk is low (i.e. in electrical compartments, when equipment is de-energized) or when the plant is shut down for periodic inspections.			X	The text is taken from NS-G-1.7	
UK	38 (Framatone)	4	21	(c) The normal or the spurious operation of fire extinguishing systems should not inadmissibly impair the required safety functions. (d) The design and the operation of fire extinguishing systems or manual fire-fighting capabilities should be suitable for the nature of fire and should not to induce other potential risks nor hazards (e.g. risk of criticality, risk of significant overpressure,...)				X	Please refer to II-97.	23, (same as FR23)
UK	39 (BAE)	4	21	"should not impair delivery of the required safety functions inadmissibly"	Does this bullet imply that activation should not damage neighboring equipment? Could be worded more clearly.		X… should not inadmissibly impair delivery of the required safety functions.		Better formulation.	
WNA	44	4	21	… as active elements of a fire compartment credited in the safety demonstration, …	Not necessary if the fire compartment is implemented only for investment protection.			X	Please refer to 1.5. This guide is dedicated to safety and this addition is not needed.	
WNA	45	4	21	In this case, the performance … "to the safety functions they protect" ???	The sentence is not clear at all. Be more explicit please or remove "to the safety functions they protect". It may not be reasonably practicable to systematically apply SFC as a design rule. The safety demonstration may be possible – though more complicated – without implanting SFC in the design of the fire detection / extinguishing systems. Therefore the whole second sentence should be re-written.					
WNA	46	4	21	(c) The normal or the spurious operation of fire extinguishing systems should not inadmissibly impair the required safety functions. (d) The design and the operation of fire extinguishing systems or manual fire-fighting capabilities should be suitable for the nature of fire and should not to induce other potential risks nor hazards (e.g. risk of criticality, risk of significant overpressure,...).				X	Please refer to II-97	
France - IRSN	44	4	23	The need to minimize spurious alarms and discharges of extinguishing media should be taken into account…	The paragraph should be introduces between paragraph 4.18. and 4.19. Preventing spurious alarms and discharges before providing compensatory measure.	X				

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
UK	40 (Framatone)	4	23	The need to minimize spurious alarms and discharges of extinguishing media should be taken into account…	The paragraph should be introduces between paragraph 4.18. and 4.19. Preventing spurious alarms and discharges before providing compensatory measure.	X				
WNA	47	4	23	The need to minimize spurious alarms and discharges of extinguishing media should be taken into account…	The paragraph should be introduces between paragraph 4.18. and 4.19. Preventing spurious alarms and discharges before providing compensatory measure.	X				
China	1	4	25	There should be announcement of the actuation of any automatically actuated fire extinguishing system to avoid adverse effects on the function of those SSCs important to safety.	This requirement has two goals: 1) Preventing the spurious operation of the automatically actuated fire extinguishing system. In this case, the range of SSCs not only limited in the in the SSCs required after a fire. 2) During the fire event, automatically actuated fire extinguishing system should operation. In this case, the SSCs in the compartment where the fire located in can't avoid the effects of fire extinguishing action.		X		with modification: Remove those.	
UK	41 (Framatone)	4	25	There should be announcement of the actuation of any automatically actuated fire extinguishing system to initiate operations on plant avoid adverse effects on the function of those SSCs important to safety required after a fire.	The announcement will not prevent adverse effects.		XThere should be announcement of the actuation of any automatically actuated fire extinguishing system to launch potential actions to avoid adverse effects on the function of those SSCs important to safety required after a fire.		Better wording, consistent also with WNA comment No. 48.	16, same as FR16 and UK10
USA	20	4	25	Revise 4.25 to read: "There should be announcement of the actuation of any automatically actuated fire extinguishing system to avoid adverse effects on the function of those SSCs important to safety required after actuation.	This expands the scope of the sentence to cover not just appropriate actuation, but spurious actuation as well—both have adverse effects.		X There should be announcement of the actuation of any automatically actuated fire extinguishing system to launch potential actions to avoid adverse effects on the function of SSCs important to safety.		Please refer to the consolidated new para. 4.25	
WNA	48	4	25	There should be announcement of the actuation of any automatically actuated fire extinguishing system to launch potential activities to avoid adverse effects on the function of those SSCs important to safety required after a fire.	The announcement will not prevent adverse effects.		X There should be announcement of the actuation of any automatically actuated fire extinguishing system to launch potential actions to avoid adverse effects on the function of those SSCs important to safety required after a fire.		'Potential activities' changed in 'potential actions'. More precise formulation.	
Iran	8	4	26	The design should be such that the system is not activated if the actuation is found to be spurious.	The system should be protected from activation from the very beginning by understanding the spurious activation.			X	This is already expressed in para. 4.14.	
Russia - Rosatom	4	4	26		add the phrase "automatic gas, powder fire extinguishing systems."			X	The comment is not clear	
UK	42 (BAE)	4	26	New Paragraph. "The fire suppression (and fire-fighting) equipment should be suitably sized to ensure re-ignition due to hot materials cannot cause a later fire."	The site should have sufficient capacity to ensure fire-fighting materials are not exhausted after the initial fire.		X The fire suppression (and fire-fighting) equipment should be suitably sized to ensure re-ignition, due to hot materials, cannot cause a later fire		Better formulation	
WNA	49	4	26	…. and where spurious operation would ~~be detrimental to the plant~~inadmissibly jeopardize safety functions, operation should be controlled by two diverse means of detection operating in series. The design should allow the operation of the system to be stopped if the actuation is found to be spurious.	Each spurious operation is detrimental to the plant. In particular for ventilation systems a NOTE shall be added that such ventilation system designs shall be prevented. Ventilation systems supporting safety functions (safety related ventilation function) shall be independent from ventilation systems serving the respective redundant safety group. See paragraph 4.38.	X				
Finland	11	4	27	Fire mitigation: preventing the spread of fires that have not been extinguished	clarity	X				
Poland	6	4	27	"Early in the design phase, the plant buildings should be subdivided into fire compartments (?) as far as reasonably practicable and, where that is not possible, at least into fire cells (?)."	Proper definition and clarification should be provided in the guide regarding used terms *"fire compartment"* and *"fire cell"*.	X				
China	2	4	28	Building structure (including columns, beams) should have a suitable fire resistance rating. The fire stability rating (mechanical as well as thermal load bearing capacity) of the structural elements that form or located within the compartment boundaries should not be less than the fire resistance rating of the fire compartment itself.	The range of structure elements that are located within the fire compartment maybe cause some misunderstandings. For example, a fire compartment contains several rooms, the walls of these rooms also located within the fire compartment, but the fire stability rating of some walls needn't the same as the fire compartment itself.			X	No added value from the modification.	
Mexico	12	4	28	... or that from the compartment boundaries should not be less than into the fire resistance rating of the fire compartment itself.	The word "form" does not have coherency into the context, it should be "from"			X	form (verb) is confirmed because the ligne 3 of para. 4.28 mentions the structural elements that form the compartment boundaries.	
France - IRSN	45	4	29		The paragraph shall be deleted if the concern is only on fire loads as already covered by 4.6. a). The paragraph might integrated in section *Special locations*. The concern on the main control room shall be integrated in4.48., that one for the containment in 4.51 in order to point out the missing segregation by fire barriers.			X	The concern is about the spread of fire and not about extinguishing. Containment and control room are only examples.	
Iran	9	4	29	"…If that is not possible, at least fire retardant and heat resistant materials should be used. In the case of usage of fire retardant in locations where presence of operators is vital, as in control room, reaction of the retardant and heat should not adversely influence the habitability by production of harmful gases."	Release of dangerous gases from fire retardant could result in diminished habitability in critical areas like control rooms, where human factor can be of high importance.			X	The intent of the comment is not clear. The problem of habitability of the main control room due to harmful gases is addressed in para. 4.29.	
WNA	50	4	29		The paragraph shall be deleted if the concern is only on fire loads as already covered by 4.6. a). The paragraph might integrated in section *Special locations*. The concern on the main control room shall be integrated in4.48., that one for the containment in 4.51 in order to point out the missing segregation by fire barriers.			X	The concern is about the spread of fire and not about extinguishing. Containment and control room are only examples.	74, same as UK67
France - IRSN	46	4	30	The aim of segregation is to reduce the risk of fires spreading, to minimize secondary effects and to prevent common cause failures.	"secondary effects" must be defined in the document	X			See resolution of similar ENISS comment. Definitions of direct effect, secondary effect, indirect effect and consequential effects will be introduced in the draft safety guide.	
USA	21	4	30	Remove "(solids, liquids, gases)"	Not necessary			X	We prefer to keep reminding that all types of combustible material should be considered.	
France - IRSN	47	4	31	…system would not prevent the execution of the safety function by another ~~division~~redundant safety system.	See comment 3. Ii should be furthermore discussed to which extend "safety function is used". Is it considered as a whole e.g. shut down the reactor, or shall it already be used already for a redundant part of a safety group. There exist plant designs where more than on redundancy is required to perform the global safety function (e.g. 4 times 50%). It might be necessary to distinguish between "fundamental safety function" and "safety function". Where the latter one is aligned to a single redundancy. There are several text passages in this document which need to be modified accordantly.		X system would not prevent the execution of the safety function within another division.		See resolution of comment 5.	
Germany	22	4	31	(…) The number of penetrations between fire compartments of different redundant divisions should be minimized and the penetrations should be sealed in a qualified manner.	1) A risk for plant safety does only arise for penetrations between different divisions. Distribution of one division into different fire compartments should be allowed. 2) "Qualified" should refer to the type of penetration seal, and not to to the noun "number".	X				
Mexico	13	4	31	The concept of sufficient segregation of redundant parts of safety systems ensures that a fire affecting one division of a safety system would not affect the execution of the safety function by another division	The word prevent can have different interpretations.			X	'prevent' an action is more precise than 'affect'. Indeed, an action can be affected in different ways, including preventing it from execution.	
UK	43 (Framatone)	4	31	…system would not prevent the execution of the safety function by another redundant safety system.	Framantone noted: See comment 3. Ii should be furthermore discussed to which extend "safety function is used". Is it considered as a whole e.g. shut down the reactor, or shall it already be used already for a redundant part of a safety group. There exist plant designs where more than on redundancy is required to perform the global safety function (e.g. 4 times 50%). It might be necessary to distinguish between "fundamental safety function" and "safety function". Where the latter one is aligned to a single redundancy. There are several text passages in this document which need to be modified accordantly. ONR considers that the document should be reviewed for consistency throughout		X system would not prevent the execution of the safety function within another division.		Better formulation	
USA	22	4	31	Add the following sentence: "Use criteria listed in 4.48, "Special Locations," to address main control rooms (MCRs)."	To clarify that 4.31 does not apply to MCRs.			X	Please consider that this does not bring more clarity. The structure with a specific section for special location is quite clear.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
WNA	51	4	31	…system would not prevent the execution of the safety function by another ~~division~~redundant safety system.	See comment 3. Ii should be furthermore discussed to which extend "safety function is used". Is it considered as a whole e.g. shut down the reactor, or shall it already be used already for a redundant part of a safety group. There exist plant designs where more than on redundancy is required to perform the global safety function (e.g. 4 times 50%). It might be necessary to distinguish between "fundamental safety function" and "safety function". Where the latter one is aligned to a single redundancy. There are several text passages in this document which need to be modified accordantly.		X system would not prevent the execution of the safety function within another division.			
USA	23	4	32	Add the following sentence: "Use criteria listed in 4.48, "Special Locations," to address main control rooms (MCRs)."	To clarify that 4.31 does not apply to MCRs.			X	Please see previous comment.	
Germany	23	4	33	The hazardous direct and indirect effects of fire are the production of smoke (with the consequential possibility of its spread to other areas not affected by the originating fire), ~~soot,~~ radiative and convective heat, ~~flame,~~ which might lead to the further spread of fire, (…)	For clarification. "Soot" is part of smoke and therefore covered by "Smoke" and "flame" is covered by "radiative and convective heat" in the same sentence.		X		OK for soot, but do not accept the other modifications: See definition of fire in footnote 3, page 4 of NS-G-1.7 See also para. 6.1 of NS-G-1.7	
Poland	7	4	33	"The hazardous direct and indirect effects of fire are the production of smoke, toxic gases (with the consequential possibility of its spread to other areas not affected by the originating fire), soot, radiative and convective heat, flame, which might lead to the further spread of fire, to equipment damage, to functional failures and to possible explosive effects, and other fire by-products, as well as pressure build-up."	Burning PVC materials are a source of toxic gases. The recommendations against limiting (forbidding) the use of PVC materials in the nuclear power plant should be provided in the document. Currently the issue with PVC toxicity during fire is not touched in the safety guide, though PVC was the material widely used in the nuclear facilities in the past as easily decontaminating material. PVC can be replaced by other non-toxic materials.			X	Toxic gases are covered by the smoke. Moreover, toxicity is widely addressed in this safety guide in the chapter related to the release of hazardous substances in the plant, and in Appendix II as far as fire is concerned.	
UK	44 (BAE)	4	33	The list of effects of fire should include "reduction of oxygen levels".	This poses a risk to all life-forms.	X			The list becomes long. Use of semicolons necessary (see American comment).	
USA	24	4	33	Use semicolons to separate each list.	This list is written in a confusing manner. It is possibly a list of lists, and if so, should use semicolons to separate each list.	X			Please refer to the consolidated para. 4.33	
Germany	24	4	34	(a) To confine the fire ~~flame~~, heat and smoke in a limited space within the plant to minimize spread of the fire and consequential effects on the surrounding plant;	The fire, not the flame is to be confined.			X	See above	
France - IRSN	48	4	35	The layout of buildings and equipment, plant ventilation systems and fixed fire detection and extinguishing means should be taken into account in consideration the mitigation of fire effects. The connections and environment with other neighbouring buildings should also be taken into account in considering the mitigation of fire effects.	This safety item should be considered according to the definition of "internal hazard" in paragraphs 2.5 and 2.6.			X	The proposed addition is already included in "layout of buildings".	
UK	45 (Framatone)	4	35	The layout of buildings and equipment, plant ventilation systems and fixed fire detection and extinguishing means should be taken into account in consideration the mitigation of fire effects. The connections and environment with other neighbouring buildings should also be taken into account in considering the mitigation of fire effects.	This safety item should be considered according to the definition of "internal hazard" in paragraphs 2.5 and 2.6.			X	The proposed addition is already included in "layout of buildings".	
WNA	52	4	35	The layout of buildings and equipment, plant ventilation systems and fixed fire detection and extinguishing means should be taken into account in consideration the mitigation of fire effects. The connections and environment with other neighbouring buildings should also be taken into account in considering the mitigation of fire effects.	This safety item should be considered according to the definition of "internal hazard" in paragraphs 2.5 and 2.6.			X	The proposed addition is already included in "layout of buildings".	
China	47	4	36	FROM: "The routes should be free from combustible materials." TO: "Combustible materials should be restricted in these routes"	It is so difficult for all the routes are totally free from combustible materials.		X Adequate access and escape routes for the firefighting teams or field plant personnel should be provided and these should be protected. The combustible materials (e.g. lighting, paints and coatings) should be limited as far as reasonably practicable. The layout of buildings should be arranged to prevent the propagation of fire and smoke from adjacent fire compartments or cells to the escape or access routes. Details are given in Appendix II.		Integrated resolution taking into account other similar comments.	
ENISS	15	4	36	4.36. Adequate access and escape routes for the firefighting teams or field plant personnel should be provided and these should be protected. The combustible material should be limited to the minimum strictly necessary along access routes (doors, lighting, paints, etc.) ~~routes should be free from combustible materials~~. The layout of buildings should be arranged to prevent the propagation of fire and smoke from adjacent fire compartments or cells to the escape or access routes. Details are given in Appendix II.	The current requirement is an absolute requirement impossible to achieve, as routes cannot be totally free from combustible materials (doors, lighting, paints, etc.).		X with modification Adequate access and escape routes for the firefighting teams or field plant personnel should be provided and these should be protected. The combustible materials (e.g. lighting, paints and coatings) should be limited as far as reasonably practicable ~~routes should be free from combustible materials~~. The layout of buildings should be arranged to prevent the propagation of fire and smoke from adjacent fire compartments or cells to the escape or access routes. Details are given in Appendix II.		See also China comment No. 47.	
Japan	8	4	36	The layout of buildings should be arranged to prevent the propagation of fire and smoke from adjacent ~~fire compartments or~~ cells to the escape or access routes. Details are given in Appendix II.	Fire compartment is protected by qualified fire barriers, and then propagation of fire and smoke from fire compartment need not to be taken into account.			X	Please refer to para. 6.4 of NS-G-1.7.	
WNA	53	4	36	…. should be provided and ~~these should be protected~~accessible during fire. ~~The routes should be free from combustible materials. The layout of buildings should be arranged to prevent the propagation of fire and smoke from adjacent fire compartments or cells to the escape or access routes.~~	This is quite conventional rules. The intrinsic request is however that these routes are accessible. It is therefore more a question an escape route travel length to an safe area and the possibility of alternative routes. Principally each passable route is an escape route. This in turn would require the absence all fire load. Furthermore having no fire load in certain areas implies a fire exclusion approach. The question arise why an are shall be free of fire load if an alternative route exist. With regards smoke spreading prevention is has to be stated that there exist to different approaches. 1) smoke venting systems, providing huge air change rates and 2) positive pressure ventilation systems. In the latter one pressure difference have to be provided. This is only possible if the pressure can be controlled on both sides of the smoke barrier which would require anteroom at each access doors. For both cases Radio Protection and Physical plant protection concerns have to be considered as well. Fire cell borders can never provide protection against smoke spreading.		X		Please refer to the integrated resolution of similar comments.	
France - IRSN	49	4	37	… compromise the availability of a redundant train of safety systems.	See comment 4				Please refer to the resolution of comment 5. The reference to comment 4 is incorrect.	
WNA	54	4	37	… compromise the availability of redundant a redundant train~~divisions~~ of safety systems.	See comment 4		X		The reference to comment 5 is incorrect; should be 4	
ENISS	16	4	38	*Ventilation systems* 4.38. Each fire compartment containing a redundant division of a safety system should have a~~n independent and fully separated~~ ventilation system designed such that the loss of one safety fire compartment should not induce the loss of the ventilation of the second safety fire compartment. Parts of the ventilation system (e.g. connecting ducts, fan rooms and filters) that are situated outside the fire compartment should have the same fire resistance rating as the compartment or, alternatively, the fire compartment penetration should be isolated by appropriately rated fire dampers.	HVAC system independence between two safety fire compartments should be understood as the loss of one safety fire compartment should not induce the loss of the ventilation of the second safety fire compartment. Nevertheless, it does not imply that *« an independent and fully separated ventilation system. »* . As written, §4.38 and §4.39 are not consistent, since §4.39 states *"If a ventilation system serves more than one fire compartment, provision should be made to maintain the segregation between fire compartments …".*		X Each fire compartment containing a redundant division of a safety system should have a ventilation system designed such that a fire in one safety fire compartment should not propagate fire effects and induce the loss of ventilation of another safety fire compartment. Parts of the ventilation system (e.g. connecting ducts, fan rooms and filters) that are situated outside the fire compartment should have the same fire resistance rating as the compartment or, alternatively, the fire compartment penetration should be isolated by appropriately		To be discussed. The initial formulation is identical to NS-G-1.7. To also consider Germany comment No. 25. The reason advocating para. 4.39 is not correct because there is a difference between 4.38 and 4.39. The para. 4.38 concerns compartments containing a redundant safety division of a safety system, while 4.39 does not specify the type of compartments. The final resolution is an integrated one taking into account other similar comments.	
France - IRSN	50	4	38	Each fire compartment containing a redundant train of a safety system should have an ….	See comment 4			X	Please refer to the resolution of comment 5. The reference to comment 4 is incorrect.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Germany	25	4	38	Each ~~fire compartment containing a redundant division of a safety system~~ redundant division of a safety system should have an independent and fully-separated-ventilation system as far as practicable. Parts of the ventilation system (e.g. connecting ducts, fan rooms and filters) that are situated outside the fire compartment should have the same fire resistance rating as the compartment or, alternatively, the fire compartment penetration should be isolated by appropriately rated fire dampers.	In typical switchgear buildings (e.g. German Konvoi-PWR) the redundant divisions are horizontally located next to each other and vertically arranged on different floors. That means that there are at least 4 fire compartments on each floor. => Not each fire compartment should have an independent ventilation system, but each redundant division.			X	The proposed formulation is not consistent with NS-G-1.7. Please refer to the integrated resolution considering other comments.	
UK	46 (Framatone)	4	38	Each fire compartment containing a redundant train of a safety system should have an ….	See comment 4; ONR considers that the document should be reviewed for consistent definition and application of "division" or "train" throughout	X			Please note that ONR is presenting two different versions of the same comment: in one redundant train is used; in the other one, redundant division is used. Also, the caveat 'so far as reasonably practicable' is used only in the second comment.	
UK	47 (BAE)	4	38	Each fire compartment containing a redundant division of a safety system should have an independent and fully separated ventilation system so far as reasonably practicable"	This is unlikely to be practical. It would mean each compartment having separate fans, ductwork and control circuitry. However, each compartment should include ventilation dampers to prevent fire & smoke spread. These could be closed automatically upon activation of the fire alarm.				See previous comment.	
UK	48 (BAE)	4	38	Additional sentence. **"These should operate automatically, where appropriate."**	Fire dampers should (in some instances) close without intervention by personnel being required.	X				
WNA	55	4	38	Each fire compartment containing a redundant train ~~division~~ of a safety system should have an ….	See comment 4			X	The reference to comment 4 is incorrect; should be 5. Please refer to the resolution of France comment number 5	
Poland	8	4	39	"If a ventilation system serves more than one fire compartment, provision should be made to maintain the segregation between fire compartments. Means should be provided to prevent the spread of fire, heat, toxic gases or smoke to other fire compartments by installing fire dampers at the boundaries of each fire compartment or by installing fire resisting duct work, as appropriate."	Release of toxic gases during fire should be considered in nuclear power plant design.			X	See resolution of previous Poland comment.	
China	48	4	40	FROM: "'Provision of automatic protection by means of a water sprinkler to cool the outside of the filter vessel (see Appendix II)." TO: be deleted	Considering there is already a suitable extinguishing system inside the charcoal vessel, the provision of automatic protection to cool the outside or the filter is not necessary.			X	Please note that para. 4.40 provides a set of measures not necessary to be implemented at the same time,	
ENISS	17	4	40	4.40. Charcoal filter banks contain a high fire load. These should be taken into consideration in determining recommendations for fire protection. A fire in a filter bank could lead to the release of radioactive materials. Passive and active means of protection should be provided to protect charcoal filter banks from fire. Such measures could include: (a) Locating the filter in a fire compartment. (b) Monitoring of the air temperature and automatic isolation of the air flow (for example, automatic stop of electrical heaters at its maximum temperature threshold). ~~(c) Provision of automatic protection by means of a water sprinkler to cool the outside of the filter vessel (see Appendix II).~~ (d) Provision of a suitable extinguishing system inside the charcoal vessel. In designing a water-based extinguishing system for that purpose, it should be recognized that if the flow rate of the water is too low, the reaction between overheated charcoal and water can result in the production of hydrogen, which might induce another fire or explosion hazard. To prevent this risk, a high water flow rate should be used. The water injected into the filter housing should be drained or considered as an additional weight in the filter mechanical design and the associated civil work.	(b)The addition of the example is to make clearer the statement. (c) the link between charcoal filters and sprinklers in Appendix II is not obvious, since for charcoal filters it is associated in II.81 to gaseous fire extinguishing systems . (d) addition of a warning: If the filled-in water mass is very high, the stability of the construction and connecting ducts/supports is endangered and should be taken into account in the filter design.	X (D)	X (C)	X (B)	The addition is not related to (b); it is rather a consequence of (b). Remove only reference to Appendix II.	
France - IRSN	51	4	40		General comment: a) Is OK as providing protection from fires outside the filter banks will furthermore provide a certain confinement if the fire is in the filter. For b) the intent is not clear. Measuring the inlet temperature and stopping the airflow prevents the filter overheating. This however can also be performed by the fire dampers to the compartment (if a compartment is created). Temperature measuring downstream may not detect a fire inside the filter. There might be better detection parameters. Of more importance is that the filter design is appropriate and that the reaction heat during the radioactivity loading process will not cause a fire inside the filter. ~~.~~			X	There is no specific comment or request. See resolution of ENISS comment.	
France - IRSN	52	4	40	Provision of a suitable extinguishing system inside the charcoal vessel. In designing a water-based extinguishing system for that purpose, it should be recognized that, if the flow rate of the water is too low, the reaction between overheated charcoal any water can result in the production of hydrogen, …	A comma is missing	X				
Germany	26	4	40	(d) Provision of a suitable extinguishing system inside the charcoal vessel. In designing a water-based extinguishing system for that purpose, it should be recognized that if the flow rate of the water is too low, ~~the reaction between overheated charcoal and water can result in the production of hydrogen, which might induce another fire or explosion hazard~~ water may evaporate and lead to a pressure increase. To prevent this risk, a high water flow rate should be used.	The myth of hydrogen production in charcoal filter fires is strongly doubted! Smouldering fires of charcoal lead to temperatures well below 700 °C – clearly lower than in typical compartment fires. Relevant water dissociation into hydrogen and oxygen takes place at temperature levels well above 1200 °C. What might have happened is that water evaporated when it was lead into filters leading to a pressure increase. For more details please consult experts/literature on silo and filter fires.			X	Temperature as high as 2000 C could be reached in charcoal fire if it is strongly ventilated. Depending on the scenario of the charcoal fire, one can expect that a temperature of the magnitude of 1200 C could be reached.	
Mexico	14	4	40	..."charcoal filter banks" I suggest to be moved to section "minimize fire loads" instead of "ventilation of secondary effects"	This topic does not aboard mitigation of secondary fire effects, it is about the danger of contain this kind of filters into a fire compartment.			X	We preferred to keep the same structure as in NS-G-1.7 where it was in ventilation systems.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
WNA	56	4	40		General comment: a) Is OK as providing protection from fires outside the filter banks, it will furthermore provide a certain confinement if the fire is in the filter. For b) the intent is not clear. Measuring the inlet temperature and stopping the airflow provides a means from filter overheating. This however can also be performed by the fire dampers to the compartment (if a compartment is created). Temperature measuring downstream may not detect a fire inside the filter. There might be better detection parameters. Automatic closing might even problematically with respect to spurious closing at a system of certain safety relevance. Manually closing by the control room personnel might be better. Of more importance is that the filter design is appropriate and that the reaction heat during the radioactivity loading process will cause a fire inside the filter. An automatic closing of dampers might be contra productive as the filter cooling is interrupted and there is still decay heat from the chemical reaction. The idea of c) is even not clear. Protection the filter from fires which are outside filter. Here compartmentation should be used. Or cooling the vessel if the fire is inside the filter? For this Sprinkler are ineffective as the response time until activation is too large for mitigation of fires inside the filter. Even its cooling capacity cannot be assessed. It is like: It may help but we don't know how much. d) is even questionable on its effectivity even under consideration of mentioned hydrogen risk and the water overloading. The best solution to protect from charcoal filter fires is to place them in fire compartments. Having a good design preventing the filter from overheating during the radioactivity loading process. Monitor the air inlet temperature an close (manually and remotely) if temperature is too high (protection of the filter). Provide ventilation dampers upstream and downstream the filter for radioactivity confinement and oxygen limitation. Keep the dampers closed when the filter is not in operation. Detection device downstream the filter unit. See also protection feature in 4.41.			X	There is no specific comment or request. See integrated resolution resolution (e.g. ENISS comment No. 17.	
ENISS	18	4	41	4.41. Where combustible filters need to be used in ventilation systems or filtration units and the subsequent malfunction or failure of these filters could result in unacceptable radioactive releases, the following precautions should be taken: (a) Filter banks should be separated from other equipment by means of adequate fire barriers. (b) Appropriate means (e.g. upstream and downstream dampers) should be used to protect the filters from the effects of fire. (c) Fire detectors, carbon monoxide gas sensors (preferably after the filters) and/or temperature sensors (~~before~~ **after** the filters) should be installed inside the ducts before and after the filter bank.	c) Why the temperature sensor should be installed before the filter? If incandescent particles are transiting and fire the filter, the temperature sensor before the filter won't detect anything, whereas the filter will be on fire. Should this sensors be installed after the filter instead?		X (c) Fire detectors, carbon monoxide gas sensors and/or temperature sensors should be appropriately installed to inform the plant personnel on fire in the filter bank.		The initial version is consistent with NS-G-1.7.	
Mexico	15	4	41	The point 4.41 "combustible filters" should be situated in the part of "minimize fire loads" instead of ventilation of secondary effects	This point is about the precautions that are necessary to take in order to prevent radioactive releases, but these recommendations are in the design of the equipment barriers.			X	Please refer to the previous comment.	
ENISS	19	4	42	4.42. As a general matter, the risk of smoke from an outside fire entering the intakes for air supply of classified or important buildings should be taken into consideration or prevented. The intakes for the fresh air supply to the fire compartments should be located at a distance from the exhaust air outlets and smoke vents of other fire compartments to the extent necessary to prevent the intake of smoke or combustion products and the malfunction of items important to safety.	This paragraph points a specific case. The proposal provides high level consideration.			X	Does not bring any added value, as the proposed addition is included at the end of the para. 4.42.	
China	49	4	44	FROM: "The design should provide for fire venting in fire compartments containing radioactive materials." TO: "The design should provide for smoke venting in fire compartments containing radioactive materials."	Spelling mistake.		X		with modification: "heat and smoke venting".	42, similar to FR41
ENISS	20	4	44	4.44. Consistent with safety, the design should provide a solution for fire venting in fire compartments containing radioactive materials. Although venting can result in the release of radioactive material to the outside environment, it can prevent, directly or through the improvement of conditions for fire extinguishing, the ultimate release of larger quantities of radioactive material. Two cases should be distinguished: (1) The possible release can be shown to be well below the acceptable doses defined by the regulatory body. (2) The amount of radioactive material in the fire compartment can make possible a release exceeding the acceptable limits as defined by the regulatory body. In this case a provision should be made for isolating the ventilation or closing fire dampers. In each case monitoring of the vented air should be performed.	Proposal for clarification			X	No added value. The initial formulation is consistent with NS-G-1.7.	43, similar to UK36
France - IRSN	53	4	44	…Two cases should be distinguished when applicable: (1) The possible release can be shown to be well below the acceptable doses when defined by the regulatory body. (2) The amount of radioactive material in the fire compartment can make possible a release exceeding the acceptable limits ~~as~~ when defined by the regulatory body. In this case a provision should be made for isolating the ventilation or closing fire dampers. In each case monitoring of the vented air should be performed.	4.44 is not consistent with French approach based on ALARA principles with no acceptable doses defined by the regulatory body	X				
France - IRSN	54	4	44	In each case monitoring of the vented air should be performed	It is no clear what is expected. Additional information or an explanation seems necessary.		X In each case monitoring of the vented air should be performed to inform operational decision making.		Explanation at the beginning of para. 4.44	
Iran	10	4	44	It is necessary to explain the direct method.	The direct method is not explained.				See the resolution of other comments. Anyway, there is no direct method in para. 4.44.	
France - IRSN	55	4	46	….~~As outlined in Appendix II, para. II.20, exceptions may be necessary in certain locations such as control rooms and the reactor containment. In such cases, the cables should be protected by means of qualified fire rated barriers or encapsulations (e.g. qualified cable wraps). Fire extinguishing systems or other appropriate means could be used, with justifications made in the fire hazard analysis.~~	This part should be described in the respective chapter of the control room			X	This part is needed to explain the first part "so far as is reasonably practicable". Moreover, it does not concern only te control room but also the containment. Consistent with NS-G-1.7	
WNA	57	4	46	….~~As outlined in Appendix II, para. II.20, exceptions may be necessary in certain locations such as control rooms and the reactor containment. In such cases, the cables should be protected by means of qualified fire rated barriers or encapsulations (e.g. qualified cable wraps). Fire extinguishing systems or other appropriate means could be used, with justifications made in the fire hazard analysis.~~	This part should be described in the respective chapter of the control room			X	This part is needed to explain the first part "so far as is reasonably practicable". Moreover, it does not concern only te control room but also the containment. Consistent with NS-G-1.7	44 (4.21 (a)), similar to FR42 (4.21 (a))
China	50	4	47	FROM: "All possible fire induced failures that could affect redundant systems performing safety functions should be analysed by electrical circuit analysis, including multiple spurious actuation." TO: "All possible fire induced failures that could affect redundant systems performing safety functions should be analysed (e.g. by electrical circuit analysts, including multiple spurious actuation)."	The specific methodology can be different among member states, so it is better to make the "electrical circuit analysis" and "multiple spurious actuation" as examples.	X				
USA	25	4	47	Revise last sentence to read: "Electrical circuits…"	Pluralize "circuit."	X				
USA	26	4	47	Add the following sentence after the first sentence: "Spurious actuation of plant components (of the same type or combinations of differing types of components) has the potential to place a given plant into an unsafe operating condition that is not bounded by the plant's safety analyses."	The new sentence clarifies the concern associated with spurious actuation.		X Spurious actuation of plant components (of the same type or combinations of differing types of components) has the potential to place a given plant into an unsafe operating condition that might not be bounded by the plant's safety analyses."		Accepted as a footnote to improve clarity, with slight modification. The footnote is palced at the first appearance of spurious actuation (i.e. para. 3.33).	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
China	51	4	48	FROM: "'Particular care should be taken to ensure that non-combustible material is used in control rooms for all electrical cabinets, the room structu.re itself, any fixed furnishings, floor and wall finishes." TO: "To the extent practicable, care should be taken to ensure that non-combustible material is used in control rooms for all electrical cabinets, the room structure itself, any fixed furnishings, floor and wall finishes."	It is so difficult that non-combustible materials are strictly used for all components mentioned in this item.		X The main control room of a nuclear power plant generally contains the equipment of different safety systems in close proximity. Particular care should be taken to ensure that, as far as reasonably practicable, non-combustible material is used in control rooms for all electrical cabinets, the room structure itself, any fixed furnishings, and floor and wall finishes.		Integrated resolution considering other similar comments.	43 (4.21 (c))
ENISS	21	4	48	~~4.48~~ he main control room of a nuclear power plant ~~could contain~~ generally contains the equipment of different safety systems in close proximity. Particular care should be taken to ensure that non-combustible material is used in control rooms for all electrical cabinets, the room structure itself, any fixed furnishings, and floor and wall finishes. Redundant equipment used to perform the same safety function should be housed in separate electrical cabinets, unless: - The cabinet structure is resistant to fire and is provided with fire barriers between sections of the cabinets; - Or control room cabinets are provided with detectors and a means guaranteeing quick extinction. ~~Fire barriers should be utilized to provide any necessary separation to the extent possible. Additional compensatory protection means should be provided as appropriate.~~	Recommendation related to IEC standard 60709. Special counter-measures are allowed when redundant information circuits are present in the same cabinet, due to the requirements of IEC standard 60964.	X		X	This guide is not relevant for such detailed recommendations. Should be in SSG-34. There is no reason to remove this part.	38 (4.21 (c)), addition of a new bullet 4.21 (d))
France - IRSN	56	4	48	Particular care should be taken to ensure that non-combustible material is used in control rooms as far as reasonably practical for all electrical cabinets, the room structure itself, any fixed furnishings, and floor and wall finishes.	Too strong as not all materials might meet non-combustible classification (e.g. the desk plate). Even under consideration that a supplementary control room exists.		X Particular care should be taken to ensure that, as far as reasonably practicable, non-combustible material is used in control rooms for all electrical cabinets, the room structure itself, any fixed furnishings, and floor and wall finishes.		Better formulation	
UK	49 (BAE)	4	48	Consider adding "e.g. in-cabinet gaseous suppression systems" at the end of 4.48.	In-cabinet gaseous suppression systems may offer value for money here and should be considered in design. It is not uncommon in the control circuitry for complex electrical systems.			X	The sentence becomes very long and unclear.	
UK	50 (Framatone)	4	48	Particular care should be taken to ensure that non-combustible material is used in control rooms as far as reasonably practical for all electrical cabinets, the room structure itself, any fixed furnishings, and floor and wall finishes.	Too strong as not all materials might meet non-combustible classification (e.g. the desk plate). Even under consideration that a supplementary control room exists.		X Particular care should be taken to ensure that, as far as reasonably practicable, non-combustible material is used in control rooms for all electrical cabinets, the room structure itself, any fixed furnishings, and floor and wall finishes.		See resolution of China comment No. 51 and France comment No.56.	47, same as FR44 and UK40
USA	27	4	48	Add additional text to 4.48 that addresses spurious actuations and provides better separation of guidance.	Such additions would provide improved criteria			X	A text on spurious actuation does not fit in para. 4.48. Additionally, there is no proposed text from the author of the comment.	46 (4.21 (c)), same as FR43 and UK38
WNA	58	4	48	Particular care should be taken to ensure that non-combustible material is used in control rooms as far as reasonably practical for all electrical cabinets, the room structure itself, any fixed furnishings, and floor and wall finishes.	Too strong as not all materials might meet non-combustible classification (e.g. the desk plate). Even under consideration that a supplementary control room exists.		X The main control room of a nuclear power plant generally contains the equipment of different safety systems in close proximity. Particular care should be taken to ensure that, as far as reasonably practicable, non-combustible material is used in control rooms for all electrical cabinets, the room structure itself, any fixed furnishings, and floor and wall finishes.		See integrated resolution considering other similar comments.	
France - IRSN	57	4	49	In order to ensure their habitability, main control rooms and the supplementary control room should be protected against the ingress of smoke and hot fire gases and against …	In order to modify 4.50.		X In order to ensure their habitability, the main control room and the supplementary control room should be protected against the ingress of smoke and hot fire gases and against …		More precise formulation.	48, same as UK41
UK	51 (Framatone)	4	49	In order to ensure their habitability, main control rooms and the supplementary control room should be protected against the ingress of smoke and hot fire gases and against …	In order to modify 4.50.		X In order to ensure their habitability, the main control rooms and the supplementary control room should be protected against the ingress of smoke and hot fire gases and against….		More precise formulation.	
WNA	59	4	49	In order to ensure their habitability, main control rooms and the supplementary control room should be protected against the ingress of smoke and hot fire gases and against …	In order to modify 4.50.		X In order to ensure their habitability, the main control room and the supplementary control room should be protected against the ingress of smoke and hot fire gases and against….		More precise formulation	
ENISS	22	4	50	4.50. ~~The fire protection of the supplementary control room should be similar to that of the main control room.~~ The objectives of the fire protection for the supplementary control room should be adapted for the role played by this equipment. Particular emphasis should be placed on protection from flooding and other effects of the operation of fire extinguishing systems. The supplementary control room should be placed in a fire compartment separate from the one containing the main control room, and its ventilation system should not be a common system shared with the main control room. The separations between the main control room, the supplementary control room and their associated ventilation systems should be such as to meet the intent of para. 2.12 after any postulated initiating event such as a fire or explosion. ~~The means by which the control is transferred from the main control room to the supplementary control room should be resilient against internal hazards to prevent malfunction or spurious actuation.~~	The objective (and the technical solution) can be different for the supplementary control room. The last sentence is not specific to fire protection. Moved to §3.33.	X		X	This is consistent with SSR-2/1. (Rev.1)	
UK	52 (Framatone)	4	50	…. control room. The supplementary control room should be placed in a fire compartment separate from the one containing the main control room, and its ventilation system should be separated such as to meet the intent of para. 2.12 after any postulated initiating event such as a fire or explosion. ……	Covered in 4.49. Not limiting to a specific design solution		X….control room. The supplementary control room should be placed in a fire compartment separate from the one containing the main control room. Its ventilation system should not be a common system shared with the main control room, and should be separated such as to meet the intent of para. 2.12 after any postulated initiating event such as a fire or explosion. ……		Consistency with para.4.166 of DS440.	
WNA	60	4	50	…. control room. ~~Particular emphasis should be placed on protection from flooding and other effects of the operation of fire extinguishing systems.~~ The supplementary control room should be placed in a fire compartment separate from the one containing the main control room, and its ventilation system should ~~not be a common system shared with the main control room. The~~ be ~~separations~~ separated ~~between the main control room, the supplementary control room and their associated ventilation systems should be~~ such as to meet the intent of para. 2.12 after any postulated initiating event such as a fire or explosion. ……	Covered in 4.49. Not limiting to a specific design solution		X The supplementary control room should be placed in a fire compartment separate from the one containing the main control room. Its ventilation system should not be a common system shared with the main control room, and should be separated such as to meet the intent of para. 2.12 after any postulated initiating event such as a fire or explosion. ……		Consistent with para.4.166 of DS440.	51, same as FR47 and UK43
WNA	61	4	51	…..which items of equipment for redundant parts of a safety group~~divisions of safety systems~~ might be close to each other. Redundant parts of a safety group~~divisions of safety systems~~ should be located as far apart as practicable.	See comment 3			X	Consistency with NS-G-1.7.	
France - IRSN	58	4	52	Reactor coolant pump motors containing a large inventory of flammable lubricating oil should be provided with fire detection systems, fixed fire extinguishing systems (normally under manual control) and oil collection systems. Similar specific care and provisions should be foreseen for oil-filled transformers.	Operating feedback in nuclear and industrial facilities.		X Similar specific care and provisions should be foreseen for oil-filled transformers as applicable		To take into account the fact that those transformers are not used everywhere.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
WNA	62	4	52	Reactor coolant pump motors containing a large inventory of flammable lubricating oil should be provided with fire detection systems, fixed fire extinguishing systems (normally under manual control) and oil collection systems. Similar specific care and provisions should be foreseen for oil-filled transformers.	Operating feedback in nuclear and industrial facilities.		X Similar specific care and provisions should be foreseen for oil-filled transformers as applicable		'as applicable' to take into account the fact that those transformers are not used everywhere.	
France - IRSN	59	4	53	… If flammable liquids have to be used, they should be liquids with high flashpoints, consistent with the operational requirements	A comma is missing	X				
France - IRSN	60	4	54	The safety features for DEC necessary in the long term of the accident should be protected against the effects of a fire~~, as it is a rather frequent event~~.	This safety features should be protected against fire without necessity to add an explanation that could be interpreted as if it is allowed to have frequently the event	X				
UK	53 (Framatone)	4	54	The safety features for DEC necessary in the long term of the accident should be protected against the effects of a fire.	No justification	X				
WNA	63	4	54	The safety features for DEC necessary in the long term of the accident should be protected against the effects of a fire~~, as it is a rather frequent event~~.	No justification	X				
China	3	4	55	Equipment sensitive to fire of the systems used for removing in the long term the heat from the containment during DEC should be redundant and located in different fire compartments.	Whether this requirement means preventing the overpressure of the containment. The systems used for removing the heat from the containment should put into operation during DEC-A, if necessary, to avoid the occurrence of severe accident. Also, DEC contains the severe accident.		X		With modification. See Finnish formulation.	
Finland	12	4	55	Equipment of the systems used for long term heat removal from the containment during severe accidents should be redundant and located in different fire compartments.	clarity	X			.	
UK	54 (BAE)	4	55	Equipment sensitive to fire **in** the systems used…	Typo.		X Equipment of the systems used for long term heat removal from the containment during severe accidents should be redundant and located in different fire compartments.		Integrated formulation to resolve several comments.	
China	52	4	56	FROM: "The equipment of the ventilation systems used in the long term during severe accidents to confine radioactive material should be redundant and located in isolatable and a *s* uitable fire protection should be provided." TO: be deleted	Same reason as 4.55.		X Ventilation equipment necessary in the long term during severe accidents to confine radioactive material should be redundant and located in different fire compartments. Portions of the system containing charcoals should be isolatable and should be designed with suitable fire protection features.		Integrated resolution considering other comments.	50; see also France comment No. 4
UK	55 (BAE)	4	56	"charcoal beds should be isolatable and suitable"	Needs rewording to ensure reader understands requirement.		X Portions of the system containing charcoals should be isolatable and should be designed with suitable fire protection features.		Integrated formulation to resolve several comments	55, same as FR50 and UK46
USA	28	4	56	Revise last sentence to read: "Their charcoal filters…"	Editorial		X Ventilation equipment necessary in the long term during severe accidents to confine radioactive material should be redundant and located in different fire compartments. Portions of the system containing charcoals should be isolatable and should be designed with suitable fire protection features.		Please refer to the integrated resolution that takes into account several comments.	
France - IRSN	61	4	57	…..that prevent or limit the formation of explosive ~~atmospheres~~mixtures.	Covers all explosive volumes. Explosive mixture is the governing description, explosive atmospheres is only a part thereof.	X				
Germany	27	4	57	Explosion hazards should be eliminated by design, as far as practicable. Priority should be given to design measures that prevent or limit the formation of explosive ~~atmospheres~~ mixtures.	The draft uses "explosive atmospheres" (4.57/2) and "explosive mixture" (e.g. 4.56/3 and 4.60/2) without distinction. It has to be considered that according to well accepted international definitions an "explosive atmosphere" is an "explosive mixture" under "atmospheric conditions" regarding pressure and temperature. Therefore "mixture" is more general. Cf. ISO/IEC 60079-20-0, Explosive atmospheres - Part 20-1: Material characteristics for gas and vapour classification - Test methods and data; Section 3 "Definitions and symbols" Cf: http://www.hse.gov.uk/fireandexplosion/atex.htm Radiolysis gases in piping systems are frequently "explosive mixtures" but no explosive atmospheres". Radiolysis gases should be treated in the explosion protection chapter or another suitable IAEA document should be referred.	X				
UK	56 (Framatone)	4	57	…..that prevent or limit the formation of explosive mixtures.	Covers all explosive volumes. Explosive mixture is the governing description, explosive atmospheres is only a part thereof.	X				
WNA	64	4	57	…..that prevent or limit the formation of explosive ~~atmospheres~~mixtures.	Covers all explosive volumes. Explosive mixture is the governing description, explosive atmospheres is only a part thereof.	X				
China	18	4	58	Compared to NS-G-l. 7, the term "fire cells" is deleted, please clarify whether these requirements are suitable for fire cells or not.				X	Compared to para 2.31 of NS-G-1.7, the focus of the present safety guide is more general in terms of separation and segregation of items important to safety among themselves and from sources of different hazards such as internal explosions.	
France - IRSN	62	4	58	Explosion hazards should be identified within buildings and compartments separating redundant items important to safety, and for other locations that constitute a significant explosion hazard to these areas. Chemical explosions (typically explosions of gas mixtures), collapse of pressurized vessels (BLEVE…), explosions induced by fire exposure and high energy arcing faults (HEAF) accompanied by rapid air expansion and plasma build-up should be considered.			X Chemical explosions (typically explosions of gas mixtures), collapse of pressurized vessels (BLEVEs), induced by fire exposure and high energy arcing faults (HEAF) accompanied by rapid air expansion and plasma build-up should be considered.		More precise formulation	56, same as FR51
Germany	28	4	58	(…) Chemical explosions (typically explosions of gas mixtures~~), explosions induced by fire exposure~~ and high energy arcing faults (HEAF) accompanied by rapid air expansion and plasma build-up should be considered.	The "*explosions induced by fire exposure* " are to be treated in the "Fire" section and in the section "failure of pressure vessels (cf. 4.78-4.80) and/or in the Appendix on hazard combinations. The phenomenon "*explosions ... by fire* " is picked up again in the Explosion section in 4.62 and 4.70. In 4.62 weak requirements for automatic Fire protection systems are mentioned (= wrong section!). Also in 4.70 provisions against BLEVEs are required by Fire protection measures and distance (= wrong section!). => The whole issue has nothing to do with explosion protection			X	Consistency with NS-G-1.7.	
Russia - Rostechnadzor	4	4	58	Explosion hazards should be identified within buildings and compartments ~~separating~~ containing ~~redundant~~ items important to safety, and for other locations that constitute a significant.	Systems important to safety consist not only from safety systems but also from normal operation systems, which, in case of their reservation, may not be placed in separating compartments.	X				

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
WNA	65	4	58	…. Chemical explosions (typically explosions of gas mixtures), explosions induced by fire exposure and high energy arcing faults (HEAF) accompanied by rapid air expansion and plasma build-up should be considered.	Further explanation necessary: "Chemical explosions (typically explosions of gas mixtures)" This the common understanding in the field of explosion protection -> aligned to a rapid combustion through the volume, but "..explosions induced by fire exposure and high energy arcing faults (HEAF) accompanied by rapid air expansion and plasma build-up" is aligned to another phenomenon. The latter two ones are more aligned to pressure build up only. Particular "explosions induced by fire exposure" might be more a phenomenon aligned to chapter "MISSELES". If chapter "INTERNAL EXPLOSIONS" shall cover all phenomenon similar as those as described in 4.58. (three items) it might be more to cover all phenomenon aligned to rapid pressure build up. This however cannot provide a sharp separation to chapter "MISSELES". It is note that most items described in chapter "INTERNAL EXPLOSIONS" are more aligned to chemical explosions.		X Such as boiling liquid expanding vapour explosions (BLEVEs) induced by fire exposure		Integrated resolution of similar comments.	
USA	29	4	59	Delete paragraph 4.59	This paragraph does not appear to add any new information. "Consequential event" is not defined or helpful.		X Consequential effects (e.g. the rupture of pipes conveying flammable gases) should be taken into account in the identification of explosion hazards		Consequential events removed.	
France - IRSN	63	4	60	Flammable gases and liquids and combustible materials that could produce or contribute to explosive gas mixtures should be excluded from compartments ...				X	The mixture is not only gas.	
Germany	29	4	60	Flammable gases and liquids and combustible materials that could produce or contribute to explosive mixtures should be excluded from compartments (i.e. enclosed areas separated by barriers) protecting items important to safety against other internal hazards and also from areas adjacent to them or connected to them by ventilation systems. Wherever this is not practicable, quantities of such materials should be strictly limited, adequate storage facilities should be provided ~~and reactive substances, oxidizers and combustible materials should be segregated from each other~~. *New text should be written on combined storage of e.g. oxidizers and combustibles. Text belongs into the Fire Protection or the Hazardous Substances chapter.*	The meaning of the last requirement is not clear: 4.60 starts with "exclusion" of "flammable gases and liquids" from "compartments". "Wherever this is not practicable" (= alternative requirement) "such materials" should be at least "limited". So far so good. In the last sentence of the alternative requirement, new material properties are mentioned which concern "reactive" substances, "oxidizers" and "combustible" materials. The term "reactive" is not defined at all and has several meanings. E.g. it is frequently used for substances reacting with (extinguishing-)water. Requirements for "oxidizers" are generally needed, not only as an alternative. The requirements for "reactive" substances and "oxidizers" are of general importance for the storage of hazardous materials. These storage restrictions may be mentioned in the sections on hazardous substances (sect. 4.207 and further) or fire safety. „Combustible material" from line 6 may be changed by „flammable gases and liquids" in explosion protection. Note: any material property classification like "flammable" should refer to the definition of the "Globally Harmonized System" (GHS) by the UN.			X	See para. 2.30 of NS-G-1.7. We kept the same para.	
WNA	66	4	60	Flammable gases and liquids and combustible materials that could produce or contribute to explosive gas mixtures should be excluded from compartments ...				X	The mixture is not only gas.	
France - IRSN	64	4	61	Wording: proposition to change "cylinders' into "Vessels"			X Hydrogen supply vessels and their distribution…		Use vessl instead of cylinder.	
China	4	4	62	Consideration should be given to the provision of automatic systems for the detection of fire and flammable gases and of automatic fire extinguishing systems to prevent a fire induced explosion from affecting items important to safety in other compartments.	Whether this requirement means limiting the impact of a fire induced explosion in the buildings. If so, the explosion in the nuclear auxiliary building may result in the all redundant series of safety system are not available, so suggested to replace the "buildings" with "compartments".		X		The end of the sentence 'in other buildings' removed.	
France - IRSN	65	4	62	Consideration should be given to the provision of automatic systems for the detection of ~~fire and~~ flammable gas release and possible automatic shut off of its supply ~~and of automatic fire extinguishing systems to prevent a fire induced explosion from affecting items important to safety in other buildings~~.	The recommendation should be limited to prevention of the creation of explosive mixture. Fire extinguishing (which requires detection) will act as measure as the prevention of an ignition source but the request aligned to ignition prevention measures for explosion protection exceed the performance which can be provided by these fire protection measures.		X Consideration should be given to the provision of automatic systems for the detection of ~~fire and~~ flammable gas release and isolation of the supply, and of automatic fire extinguishing systems to prevent a fire induced explosion from affecting items important to safety in other buildings~~.~~		Integrated resolution considering other similar comments.	
Germany	30	4	62	~~Consideration should be given to the provision of automatic systems for the detection of fire and flammable gases and of automatic fire extinguishing systems to prevent a fire induced explosion from affecting items important to safety in other buildings.~~	Cf. comment on 4.58. A "fire induced" vessel or pipe failure is covered by fire protection measures. => definitely wrong section, maybe delete completely.			X	Integrated resolution considering other comments (e.g. France comment No. 62) and consistency with NS-G-1.7.	
UK	57 (Framatone)	4	62	Consideration should be given to the provision of automatic systems for the detection of flammable gase releases and fire, and to automatic shut off of its supply and fire extinguishing systems to prevent a fire induced explosion from affecting items important to safety in other buildings.	The recommendation should be limited to prevention of the creation of explosive mixture. Fire extinguishing (which requires detection) will act as measure as the prevention of an ignition source but the request aligned to ignition prevention measures for explosion protection exceed the performance which can be provided by these fire protection measures.		X Consideration should be given to the provision of automatic systems for the detection of ~~fire and~~ flammable gas release and isolation of the supply, and of automatic fire extinguishing systems to prevent a fire induced explosion from affecting items important to safety in other buildings~~.~~		Better and complete formulation	
WNA	67	4	62	Consideration should be given to the provision of automatic systems for the detection of ~~fire and~~ flammable gas~~s~~ release and possible automatic shut off of its supply ~~and of automatic fire extinguishing systems to prevent a fire induced explosion from affecting items important to safety in other buildings.~~	The recommendation should be limited to prevention of the creation of explosive mixture. Fire extinguishing (which requires detection) will act as measure as the prevention of an ignition source but the request aligned to ignition prevention measures for explosion protection exceed the performance which can be provided by these fire protection measures.		X Consideration should be given to the provision of automatic systems for the detection of fire and flammable gas release and isolation of the supply, and of automatic fire extinguishing systems to prevent a fire induced explosion from affecting items important to safety in other buildings.		Better and complete formulation.	
France - IRSN	66	4	63	….should be placed in well ventilated external locations separated from the plant area containing items important to safety. If placed indoors, the equipment should be positioned ~~on an outside wall and separated~~remotely from areas containing items important to safety. Interior storage locations should be provided with……	The idea of placing such items at the outer walls. If the concept is to provide pressure release this should be said. "separate" is confusing as it rise the impression that there is pressure resistant boundary.	X				30, (same as FR32 and UK24)
Germany	31	4	63	Hydrogen supply cylinders or special containers for hydrogen and their distribution manifolds should be placed in well ventilated external locations separated from the plant area containing items important to safety. If placed indoors, the equipment should be ~~positioned on an outside wall and s~~eparated from areas containing items important to safety….	Requirement can't be understood and is considered ineffective, since outside walls of NPPs are very massive. In case of hydrogen explosion in a confined space the overpressure is basically everywhere the same.		X Hydrogen supply vessels and their distribution manifolds should be placed in well ventilated external locations separated from the plant area containing items important to safety. If placed indoors, the equipment should be positioned remotely from areas containing items important to safety.		Resolution consistent with resolution of other MS comments.	25 (4.6 (c))
UK	58 (Framatone)	4	63	….should be placed in well ventilated external locations separated from the plant area containing items important to safety. If placed indoors, the equipment should be positioned remotely from areas containing items important to safety. Interior storage locations should be provided with……	The idea of placing such items at the outer walls. If the concept is to provide pressure release this should be said. "separate" is confusing as it rise the impression that there is pressure resistant boundary.	X				31, (same as FR33 (4.6 (b))
WNA	68	4	63	….should be placed in well ventilated external locations separated from the plant area containing items important to safety. If placed indoors, the equipment should be positioned ~~on an outside wall and separated~~remotely from areas containing items important to safety. Interior storage locations should be provided with……	The idea of placing such items at the outer walls. If the concept is to provide pressure release this should be said. "separate" is confusing as it rise the impression that there is pressure resistant boundary.	X				32, (same as FR34 (4.6(c)) and UK25 (4.6 (c))
WNA	69	4	63	…is kept at a safe level below the lower flammability limit. The layout of the room and the design of the ventilation system should be such as to prevent local accumulations of hydrogen. ~~with or without an operational ventilation system.~~	If hydrogen is released it will accumulate inside a room if there is no ventilation for diluting the hydrogen. The design of the room and the ventilation system shall be such that no local accumulation will occur. This is more a question e.g. ceiling designs having pockets and the allocation of the ventilation nozzles.		X Each electrical battery room that contains batteries that could generate hydrogen during operation should be provided with an adequate ventilation system such that the hydrogen concentration is kept at a safe level below the lower flammability limit. The layout of the room and the design of the ventilation system should be such as to prevent local accumulations of hydrogen.		Please refer to the integrated resolution of similar comments..	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
ENISS	23	4	65	4.65. Each electrical battery room that contains batteries that could generate hydrogen during operation should be provided ~~with a separate ventilation exhaust arranged to discharge directly to the outside of the building~~ with an adequate ventilation system such that the hydrogen concentration is kept at a safe level below the lower flammability limit. The layout of the room and the design of the ventilation system should be such as to prevent local accumulations of hydrogen in the event of ventilation failure. ~~with or without an operational ventilation system~~.	It could be a good means but it is quite difficult to achieve for rooms “deep inside” a building. Clarification proposed.	X	X With “The layout of the room and the design of the ventilation system should be such as to prevent local accumulations of hydrogen.”		Consistency with resolution of UK comment No. 59.	
UK	59 (Framatone)	4	65	…is kept at a safe level below the lower flammability limit. The layout and design of both the room and the ventilation system should be such as to prevent local accumulations of hydrogen.”	If hydrogen is released it will accumulate inside a room if there is no ventilation for diluting the hydrogen. The design of the room and the ventilation system shall be such that no local accumulation will occur. This is more a question e.g. ceiling designs having pockets and the allocation of the ventilation nozzles.		X The layout of the room and the design of the ventilation system should be such as to prevent local accumulations of hydrogen.		Integrated formulation to resolve several comments.	33 (4.6 (b))
UK	60 (BAE)	4	65	Additional sentence….” **An adequate airflow into the area should be provided to prevent hydrogen build-up.”**	The room needs air both into and out of the room to prevent gas build-up. Excessive hydrogen could lead to an explosion. ONR considers that alternative wording may be needed.			X	The last sentence of para. 4.65 is more strict because the design should be such that even without air flow, hydrogen build-up is avoided.	34 (4.6 (c))
China	5	4	66	The electrical battery room should be provided with a hydrogen detection system and ventilation system sensors arranged to provide alarms in the main control room to indicate hydrogen levels approaching the lower flammability limit and any failure of the ventilation system. If fire dampers are installed on ventilation systems serving battery rooms, the effects of their closure on the buildup of hydrogen should be considered.	Suggest modifying the description of "control room", making it more accurate. For example: main control room and/or supplementary control room.		X		Combine the final formulation with France proposal in comment No. 67, but as "Actions should then be...as far as relevant"..	
ENISS	24	4	66	4.66. The electrical battery room should be provided with a hydrogen detection system and ventilation system sensors arranged to provide alarms in the control room to indicate hydrogen levels approaching the lower flammability limit and any failure of the ventilation system. If fire dampers are installed on ventilation systems serving battery rooms, the effects of their closure on the buildup of hydrogen should be considered. The possibility of stopping the charging of the batteries in case of alarm should be considered as a solution.	The release of hydrogen is linked to the charging of the batteries. Stopping the charge contributes to prevention of explosion.		X In the case of alarm, actions should be taken such as stopping the battery charging as far as relevant.		Better formulation.	
France - IRSN	67	4	66	The electrical battery room should be provided with a hydrogen detection system and ventilation system sensors arranged to provide alarms in the control room to indicate hydrogen levels approaching the lower flammability limit and any failure of the ventilation system. If fire dampers are installed on ventilation systems serving battery rooms, the effects of their closure on the buildup of hydrogen should be considered. Safety actions should then be taken, such as stopping the battery charge as far as relevant.			X In the case of alarm, actions should be taken such as stopping the battery charging as far as relevant.		Better wording	
UK	61 (Framatone)	4	66	The electrical battery room should be provided with a hydrogen detection system and ventilation system sensors arranged to provide alarms in the control room to indicate hydrogen levels approaching the lower flammability limit and any failure of the ventilation system, so that appropriate action could be implemented in a timely manner. If fire dampers are installed on ventilation systems serving battery rooms, the effects of their closure on the buildup of hydrogen should be considered. . Provisions to stop manually or automatically hydrogen generation in case of alarms should be implemented. However, these provisions should not impair the safety functions of the plant.	Same reason as for the comment n° 21: the lonely detection is not sufficient. Detection of the hydrogen concentration will not help because the only prevention measure is ventilation). If ventilation stops hydrogen will accumulate Compensatory measure can only be stopping the charging process – without impairing the realization of safety functions - or providing alternative ventilation.			X		
WNA	70	4	66	The electrical battery room should be provided with a hydrogen detection system or a detection system ~~and ventilation system sensors arranged to provide alarms in the control room to indicate hydrogen levels approaching the lower flammability limit and~~indicating any failure of the ventilation system, so that appropriate action could be implemented in a timely manner. If fire dampers are installed on ventilation systems serving battery rooms, the effects of their closure on the buildup of hydrogen should be considered. . Provisions to stop manually or automatically hydrogen generation in case of alarms should be implemented. However, these provisions should not impair the safety functions of the plant.	Same reason as for the comment n° 21: the lonely detection is not sufficient. Detection of the hydrogen concentration will not help because the only prevention measure is ventilation). If ventilation stops hydrogen will accumulate Compensatory measure can only be stopping the charging process – without impairing the realization of safety functions - or providing alternative ventilation.		X In the case of alarm, actions should be taken such as stopping the battery charging as far as relevant.		Please refer to the integrated resolution of similar comments related to para. 4.66..	67, same as FR65 and UK57
France - IRSN	68	4	67	..given to the use of recombinant batteries~~to replace lead acid cells~~. Recombinant batteries generate less hydrogen, but it should…	Recombinant batteries or recombinant plugs recombine the hydrogen to the battery acid, it does not replace the lead acid.	X			See also resolution of similar comments.	
Germany	32	4	67	Consideration should be given to the use of recombinant batteries ~~to replace lead acid cells~~. Recombinant batteries generate less hydrogen, but it should not be assumed that this will eliminate the risk of hydrogen production.	The sentence indicates that “recombiners” would replace lead batteries. This is not the case to the knowledge of the writer. Instead, the recombiner is used in combination with lead battery technology See e.g. http://www.hefra.nl/docs/webshop.asp?act=doc&id=4823 .	X				
UK	62 (Framatone)	4	67	..given to the use of recombinant batteries. Recombinant batteries generate less hydrogen, but it should…	Recombinant batteries or recombinant plugs recombine the hydrogen to the battery acid, it does not replace the lead acid.	X				68, same as FR66 and UK58
WNA	71	4	67	..given to the use of recombinant batteries ~~to replace lead acid cells~~. Recombinant batteries generate less hydrogen, but it should…	Recombinant batteries or recombinant plugs recombine the hydrogen to the battery acid, it does not replace the lead acid.	X				70, same as UK61
ENISS	25	4	69	**Mitigation of explosions: mitigate the effects of explosions** 4.69 General f~~F~~eatures ~~that can resist or limit explosion effects (e.g. appropriate design or operating provisions)~~ should be in place to minimize the risk~~s~~ of explosions: examples are the limitation of the volumes of explosive gases, the elimination of ignition sources, adequate ventilation rates, the appropriate choice of electrical equipment designed for use in an explosive atmosphere, inerting, ~~explosion venting (e.g. blow-out panels or other pressure relief devices) and separation from items important to safety. Equipment that needs to maintain its functionality following a postulated initiating event should be identified and adequately designed and qualified~~.	Sentences deleted were moved to NEW specific §4.72 The new §4.69 could be moved after §4.60, as these are prevention features.		X Features that can resist or limit explosion effects (e.g. appropriate design or operating provisions) should be in place to minimize the risks: examples are the limitation of the volumes of explosive gas mixtures, , inerting, explosion venting (e.g. blow-out panels or other pressure relief devices) and separation from items important to safety. Equipment that needs to maintain its functionality following a postulated initiating event should be identified and adequately designed and qualified.		Integrated resoultion considering other similar comments.	

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France - IRSN	69	4	69	Features that can resit or limit explosion effects (e.g. appropriate design or operating provisions) should be in place to minimize the risks: examples are the limitation of the volumes of explosive gases, ~~the elimination of the ignition sources, adequate ventilation rates,~~ the appropriate choice of electrical equipment designed for use in an explosive atmosphere, ~~inerting, explosion venting (e.g. blow-out panels or other pressure relief devices)~~ and separation from items important to safety…	Some of the given contribute to prevention the explosion hazard.		X Features that can resist or limit explosion effects (e.g. appropriate design or operating provisions) should be in place to minimize the risks: examples are the limitation of the volumes of explosive gas mixtures, , inerting, explosion venting (e.g. blow-out panels or other pressure relief devices) and separation from items important to safety. Equipment that needs to maintain its functionality following a postulated initiating event should be identified and adequately designed and qualified.		Integrated resoultion considering other similar comments.	
Germany	33	4	69	Features that can resist or limit explosion effects (e.g. appropriate design or operating provisions) should be in place to minimize the risks: examples are the limitation of the volumes of explosive gas mixtures, ~~the elimination of ignition sources, adequate ventilation rates, the appropriate choice of electrical equipment designed for use in an explosive atmosphere~~, inerting, explosion venting (e.g. blow-out panels or other pressure relief devices) and separation from items important to safety. Equipment that needs to maintain its functionality following a postulated initiating event should be identified and adequately designed and qualified.	... volumes of explosive gases -> … volumes of explosive gas mixtures. The measures: “elimination of ignition sources”, “adequate ventilation rates”, “appropriate choice of electrical equipment” are measures for explosion prevention and not for mitigation.		X Features that can resist or limit explosion effects (e.g. appropriate design or operating provisions) should be in place to minimize the risks: examples are the limitation of the volumes of explosive gas mixtures, , inerting, explosion venting (e.g. blow-out panels or other pressure relief devices) and separation from items important to safety. Equipment that needs to maintain its functionality following a postulated initiating event should be identified and adequately designed and qualified.		Integrated resolution considering other similar comments.	
ENISS	26	4	70	4.70. The risk of explosions induced by fire exposure such as boiling liquid expanding vapour explosions (BLEVEs) should be minimized by means of separation between potential fire exposures and potentially explosive liquids and gases, or by active measures such as suitable fixed fire suppression systems designed to provide cooling and vapour dispersion. Consideration should be given ~~to the blast overpressure and missiles generated by BLEVEs, and~~ to the potential for the ignition of flammable gases at a location distant from the point of release, which could result in the explosion of a gas cloud. The potential for BLEVE’s from rapid expansion of non-flammable fluids should be minimized by avoiding operation above the superheat limit so far as is reasonably practicable.	A new §4.73 is proposed concerning specifically blast overpressure and missiles generated by BLEVE, in the mitigation of explosions part.			X	The proposal introduces an important restructuring of the text with limited added value	
France - IRSN	70	4	70	4.70a. The risk of explosions induced by fire exposure such as boiling liquid expanding vapour explosions (BLEVEs) should be minimized by means of separation between potential fire exposures and potentially explosive liquids and gases, or by active measures such as suitable fixed fire suppression systems designed to provide cooling ~~and vapour dispersion~~. 4.70b. Consideration should be given to the blast overpressure and missiles generated by BLEVEs, and to the potential for the ignition of flammable gases at a location distant from the point of release, which could result in the explosion of a gas cloud. The potential for BLEVE’s from rapid expansion of non-flammable fluids should be minimized by avoiding operation above the superheat limit so far as is reasonably practicable.	There are two separate recommendations in 4.70: prevent BLEVE and consider BLEVE. They should be separated. Besides, BLEVE prevention should not be in the part "Mitigation of explosion…" as it is prevention and not mitigation Extinguishing systems are not capable to provide vapor dispersion in such potential BLEVE situations. Instead of cooling it is better to place systems in separate fire compartment preventing the system components from fire exposure.		X		See also resolution of other similar comments calling for the reorganization of the paragraphs and their distribution between prevention of explosions and mitigation of etheir effects.	
France - IRSN	71	4	70	Consideration should be given to the blast overpressure and missiles generated by BLEVEs, and to the potential for the ignition of flammable gases at a location distant from the point of release, which could result in the explosion of a gas cloud.	Not specific to BLEVE. This text should be the subject of a specific paragraph.			X	The reason is not clear	
Germany	34	4	70	~~The risk of explosions induced by fire exposure such as boiling liquid expanding vapour explosions (BLEVEs) should be minimized by means of separation~~ between ~~potential fire exposures and potentially explosive liquids and gases, or by active measures such as suitable fixed fire suppression systems designed to provide cooling and vapour dispersion.~~ Consideration should be given to the blast overpressure and missiles generated by BLEVEs, and to the potential for the ignition of flammable gases at a location distant from the point of release, which could result in the explosion of a gas cloud. (…)	Cf. comment on 4.58. A “fire induced” vessel or pipe failure followed by BLEVE is covered by Fire protection measures (separation from Fire exposure or Fire suppression). => wrong section, maybe delete completely.		X		Integrated resolution considering other comments. The first part of the paragraph has been moved to the prevention section.	
Germany	35	4	70	(…) ~~The potential for BLEVE’s from rapid expansion of non-flammable fluids should be minimized by avoiding~~ operation ~~above the superheat limit so far as is reasonably practicable.~~	Cf. comment on 4.58. A BLEVE of non-flammable fluids is physically impossible. The phenomenon should be treated in the section “failure of pressure vessels (cf. 4.78-4.80).			X,	Consistency with NS-G-1.7, para. 2.34	
UK	63 (Framatone)	4	70	4.70a. The risk of explosions induced by fire exposure such as boiling liquid expanding vapour explosions (BLEVEs) should be minimized by means of separation between potential fire exposures and potentially explosive liquids and gases, or by active measures such as suitable fixed fire suppression systems designed to provide cooling ~~and vapour dispersion~~. 4.70b. Consideration should be given to the blast overpressure and missiles generated by BLEVEs, and to the potential for the ignition of flammable gases at a location distant from the point of release, which could result in the explosion of a gas cloud. The potential for BLEVE’s from rapid expansion of non-flammable fluids should be minimized by avoiding operation above the superheat limit so far as is reasonably practicable.	There are two separate recommendations in 4.70: prevent BLEVE and consider BLEVE. They should be separated. Besides, BLEVE prevention should not be in the part "Mitigation of explosion…" as it is prevention and not mitigation Extinguishing systems are not capable to provide vapor dispersion in such potential BLEVE situations. Instead of cooling it is better to place systems in separate fire compartment preventing the system components from fire exposure.		X		Integrated resolution, with change of the order of the paragraphs	
WNA	72	4	70	4.70a. The risk of explosions induced by fire exposure such as boiling liquid expanding vapour explosions (BLEVEs) should be minimized by means of separation between potential fire exposures and potentially explosive liquids and gases, or by active measures such as suitable fixed fire suppression systems designed to provide cooling ~~and vapour dispersion~~. 4.70b. Consideration should be given to the blast overpressure and missiles generated by BLEVEs, and to the potential for the ignition of flammable gases at a location distant from the point of release, which could result in the explosion of a gas cloud. The potential for BLEVE’s from rapid expansion of non-flammable fluids should be minimized by avoiding operation above the superheat limit so far as is reasonably practicable.	There are two separate recommendations in 4.70: prevent BLEVE and consider BLEVE. They should be separated. Besides, BLEVE prevention should not be in the part "Mitigation of explosion…" as it is prevention and not mitigation Extinguishing systems are not capable to provide vapor dispersion in such potential BLEVE situations. Instead of cooling it is better to place systems in separate fire compartment preventing the system components from fire exposure.		X		Please refer to the integrated resolution of similar comments. The first para. ‘The risk of explosions induced by fire…. And vapour dispersion’ has been moved to the section of ‘Prevention of explosion hazards’.A	
ENISS	27	4	71	~~4.71. Some hazards (e.g. HEAF) do not meet the formal definition of an “explosion” yet they act like explosions in terms of the loads they impart on nearby SSCs (e.g. temperature, pressure, missiles); therefore, similar design provisions are appropriate for mitigating them.~~	See NEW §4.74			X	See resolution of ENISS comment number 26	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
ENISS	32	4	71	4.74~~1~~. Some hazards (e.g. HEAF) do not meet the formal definition of an "explosion" yet they act like explosions in terms of the loads they impart on nearby SSCs (e.g. temperature, pressure, missiles); therefore, similar design provisions are appropriate for limiting the risk and/or mitigating the effects.	See §4.71 Complements added to distinguish clearly the prevention part and the mitigation part.		X		Change "are appropriate" in "should be considered".	
ENISS	28	4	72	~~4.72. Design provisions to limit the consequences of an explosion (overpressure, missile generation or fire) should be in place. The consequential effects of postulated explosions on items important to safety should be assessed against the objectives of para. 2.12. Access and escape routes for operating personnel should also be assessed. Special design provisions should be made if necessary.~~	Moved to NEW §4.75			X	See resolution of ENISS comment number 26	
ENISS	30	4	72	**Mitigation of explosions: mitigate the effects of explosions** NEW 4.72. Features mentioned in 4.69, if not sufficient to rule the risk out, could at least limit the effects of explosions. Features that can resist or limit explosion effects (e.g. appropriate design or operating provisions) should be in place to minimize the risks as well: ~~examples are the limitation of the volumes of explosive gases, the elimination of ignition sources, adequate ventilation rates, the appropriate choice of electrical equipment designed for use in an explosive atmosphere, inerting,~~ explosion venting (e.g. blow-out panels or other pressure relief devices, standard doors could provide this role) and separation from items important to safety. Equipment that needs to maintain its functionality following a postulated initiating event should be identified and adequately designed and qualified.	Moved from §4.69			X	See resolution of ENISS comment number 26	
ENISS	33	4	72	~~**Mitigation of explosions: limiting the severity of explosions**~~ *NEW* 4.75~~2~~. Design provisions to limit the consequences of an explosion (overpressure, missile generation or fire) should be in place. The consequential effects of postulated explosions on items important to safety should be assessed against the objectives of para. 2.12. Access and escape routes for operating personnel should also be assessed. Special design provisions should be made if necessary.	Differences between limiting the severity of explosions and mitigating its effects are unclear: it is all about mitigating the explosions by mitigating/reducing the effects. Title suppressed.			X	See resolution of ENISS comment number 26	
UK	64	4	72	…objectives of para. 2.12. Access and escape routes for operating personnel performing manual actions for safety functions and first responders should also be assessed. Special design….	Consider wording consistent with other sections (consider both operators delivering FSFs or first responders)		X Access and escape routes for operating personnel, performing manual actions important to safety, should also be assessed. Special design provisions should be made if necessary.		Better wording.	
WNA	73	4	72	…objectives of para. 2.12. Access and escape routes for operating personnel performing manual actions for safety functions ??? should also be assessed. Special design….	This is more a conventional rule which needs to be assessed anyhow and should therefore not be explicitly mentioned.		X Access and escape routes for operating personnel performing manual actions for safety functions and first responders should also be assessed. Special design….		More complete formulation	
ENISS	29	4	73	NEW 4.~~73~~71. Wherever there is a potential hazard due to hydrogen in plant operations, provisions should be made to control the hazard by the use of hydrogen monitors, recombiners, adequate ventilation, controlled hydrogen burning systems, equipment designed for use in an explosive atmosphere or other appropriate means. Where inerting is used, fire hazards arising during non-inert gas protected operation periods (maintenance and refuelling) should be considered, and care should be taken to ensure that gas mixtures remain within the limits of non-flammability.	New number.			X	See resolution of ENISS comment number 26	
ENISS	31	4	73	NEW 4.73 Consideration should be given to the blast overpressure and missiles generated by BLEVEs.	See §4.70			X	See resolution of ENISS comment number 26	
Indonesia	2	4	74	4.74. Nuclear power plants also contain pressurized components (e.g. pipe work, valves, pressure vessels and housing of control rods) and rotating machinery (e.g. turbine- generators, diesel generators, pumps, fans, blowers, compressors) that can fail disruptively and cause missiles with destructive kinetic energy for the surrounding SSCs.	We add term "also" to make relationship between section 4.74 and the previous as an introductory.			X	In a footnote and with modification. No need, since the definition is introduced through a footnote.	
Indonesia	1	4	74	4.7…The common definition of missiles are object which is forcibly propelled at a target, either by hand or mechanical force such as used in military weapon. However, any systems including manufacturing, transportation and power plant utilizes equipment or devices that impose mechanical forces which generated either by pressure, rotation or gravity.	We need an introductory paragraph to allow the readers aware with any mechanism-generated missiles which is possibly occurred and to be considered, not only in nuclear power plant		X		In a footnote and with modification. No need, since the definition is introduced through a footnote.	
Poland	11	4	74	"Nuclear power plants contain pressurized components (e.g. pipe work, valves, pressure vessels and housing of control rods) and rotating machinery (e.g. turbine-generators, diesel generators, pumps, fans, blowers, compressors) that can fail disruptively and cause flying missiles with destructive kinetic energy which can damage ~~for the~~ surrounding important to safety SSCs."	Should be clarified, that missiles can damage important to safety SSC's, not just be a source of kinetic energy.			X	The proposed wording is already in 'destructive'. No need to add 'flying' to missile.	
ENISS	34	4	75	4.75 Sources of possible missiles should be identified; ~~the frequency,~~ the possible magnitude of kinetic energy and the likely size and trajectory of missiles should be estimated. The possible targets and their effects on items important to safety should be assessed.	The phrase 'the frequency' implies a fully probabilistic analysis of missiles, however, this approach is not permitted in several countries. The phrase 'the likely' is already present and can be interpreted to adequately cover both a deterministic and/or probabilistic approach.		X Use likelihood instead of frequency.			
Mexico	16	4	76	A narrative form of the deterministic aspect of safety...	What does it mean?			X	Although there is no text proposal, the meaning of the sentence is that even for probabilistic methods, the consequence portion of the analysis should account for uncertainty by applying adequate safety margins.	81, same as UK74

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Poland	12	4	76	"4.76… Some missiles are postulated on a deterministic basis and their effects on the important to safety SSCs in terms of strikes and damage are also evaluated. A ~~narrative form of the~~ detailed deterministic ~~aspects of~~ safety ~~cases~~ assessment should be presented even in cases when all aspects of the missile hazard — initiation, strike and damage — are treated probabilistically." "4.105… With some vessels, dome end failure might lead to the most massive potential missile. Depending on the vessel and operating conditions, more fragmentary failure could also be possible. To develop ~~a safety case~~ protective measures against missiles, in the safety assessment particular attention should be paid to characterize potential missiles from the particular vessel and the effect of the missiles on plant and ~~structures~~ important to safety SSC's local to the vessel." "4.199. This safety guide only ~~considers~~ provides recommendations for protection against the "prompt" effects of EMI as an internal hazard ~~on the overall safety case~~ for the nuclear power plant equipment and important to safety SSC's, which shall be considered in the relevant safety assessment…" "4.215. This safety guide only ~~considers~~ provides recommendations for protection against the "prompt" effects of the release of hazardous material within the plant ~~on the overall safety case~~ for the nuclear power plant equipment and important to safety SSC's, which shall be considered in the relevant safety assessment…".	1) The meaning of term *"safety case"* is unclear. This is an artificial term used mostly in UK, which has hidden meaning (requires comprehensive definition of term) and as of that is not directly translatable to other languages. Direct translation of "safety case" means "safety file" what either way have no sense in sentences. Nevertheless, it is absolutely clear that artificial term *"safety case"* can be easily replaced by other clear and direct terms without hidden meaning, such as *"safety assessment"*, *"safety analysis"*, *"safety report"*, or *"safety justification"*. Unified and understandable term for all countries and properly translatable to other languages should be used in any Safety Guide and related documents. 2) It is unclear how *"safety case"* itself can protect against missiles (see 4.105). Not the mystery *"safety case"* protects from missiles, but relevant design of SSC's and implemented protective measures provides protection. Proper clarification should be provided, that not *"safety cases"* protects SSC's and plant from hazards, but the protective and compensatory measures implemented in the design. 3) It is unclear how EMI or release of hazardous material can be a hazard to *"safety case"* (see 4.199 and 4.215). EMI or release of hazardous material can be a hazard only to NPP equipment and important to safety SSC's. Moreover, 1st sentences of paragraphs 4.199 and 4.215 are incomprehensible as a whole. It should be noted, that purpose of the safety guide is not just describe effects of hazard, but to provide recommendations for the means and measures of protection against hazards. Paragraphs 4.199 and 4.215 need to be revised and clarified.		X		Better wording	
China	19	4	77	As the ricochet effect has been addressed in this paragraph, please give more detailed guidance on this effect.		X			Please refer to the consolidated para. 4.77 taking into account the comment No. 35 from ENISS.	87, same as UK80
ENISS	35	4	77	4.77 The potential for secondary missiles that could damage SSCs important to safety should also be evaluated, including consideration of ~~fragment~~ potentially adverse ricochet effects (or rebound), if considered credible on the basis of expert judgement (e.g. the residual energy of the missile following impact can be judged insufficient to induce damage by ricochet/rebound when the relative robustness of targets in the vicinity is considered).	Please explain the phenomena. Is it on the impacted face of the civil structure or on the opposite face? Is-it spalling? Scabbing? Rebound? Secondary effect? Is it ricochet effect on every surface (steel, concrete,…)? And what about the energy loss after impact?		X		Divide the paragraph in two sentences, for example: The potential for secondary missiles that could damage SSCs important to safety should also be evaluated. This evaluation should include the consideration of potentially adverse ricochet effects, if considered credible on the basis of expert judgement (e.g. the residual energy of the missile following impact can be judged insufficient to induce damage by ricochet when the relative robustness of targets in the vicinity is considered).	
ENISS	36	4	78	4.78 In nuclear power plants… design limits. The gross failure of such vessels (such as the reactor pressure vessel, or other high quality vessels) is therefore generally believed to be sufficiently improbable that systematic consideration of the rupture of these vessels as an internal hazard should not be necessary.	Please add some other examples because it looks like the gross failure is improbable only for large high integrity components classed as 'non-breakable' components. We could estimate that for other components with high level of quality and in-service inspection and so on, the quality is sufficient to avoid failure. And this paragraph could be also applied to valves (see comment §4.81 about valves).		X In nuclear power plants… design limits… The gross failure of such vessels (the reactor vessel, or other high quality vessels designed with large margins) is therefore generally believed to be sufficiently improbable that systematic consideration of the rupture of these vessels as an internal hazard should not be necessary.		More precise wording.	80 (Appendix II, page 69)
France - IRSN	72	4	78	4.78. In nuclear power plants, pressure vessels important to safety are designed and constructed by means … the vessels remain within their design limits. This explains briefly and not exhaustively why the gross failure of such vessels (such as the reactor pressure vessel) is therefore generally believed to be sufficiently improbable that consideration of the rupture of these vessels as an internal hazard should not be necessary [10].	This article oversimplifies the approach related to the rupture of vessels such as reactor pressure vessel (and the simple reference to [10] is not sufficient). Besides, this topic is not relevant for DS 494. This should be highlighted in the article		X In nuclear power plants… design limits… The gross failure of such vessels (the reactor vessel, or other high quality vessels designed with large margins) is therefore generally believed to be sufficiently improbable that systematic consideration of the rupture of these vessels as an internal hazard should not be necessary.		Better and concise formulation. The paragraph is already long and does not need additional narrative considerations.	
UK	65 (BAE)	4	78	Additional sentence**…"The effects of shock loading (by any means) should be given due consideration**".	Such effects can be caused by sudden temperature changes, physical loading, pressure changes, etc. Place in 4.79 - consideration of overpressure effects.			X	The proposed text does not fit neither in 4.78 nor in 4.79.	
Mexico	17	4	80	Alternatively, a simplified conservative approach is acceptable in order to determine the missiles to be considered...	I think it miss some explanation about what is a simplified conservative approach. Or should be mentioned any reference to take the information.			X	A simplified conservative approach does not need explanation. It is the opposite of the precedent approach.	
ENISS	37	4	81	*Failures of valves* In the case of valves which are designed and constructed by means of extremely comprehensive and thorough practices, and, assured by a surveillance programme during commissioning and operation, a failure is generally assumed to be sufficiently improbable not to require a systematic assessment.	The failure of the valve body is not considered because of high quality principle, but the same consideration could be applied for the entire valve with a high quality construction, in-service inspection and so on (see comment §4.78 about vessels and see §4.91).			X	This proposal is covered by the second part of para. 4.82	
ENISS	38	4	82	4.82. Valve bodies are usually designed, constructed and maintained in such a manner that they are substantially stronger than the connected piping. For this reason it is generally accepted that the generation of missiles resulting from the failure of the valve body itself is sufficiently unlikely ~~in most cases~~ such that it need not therefore be considered in the design and/or evaluation of the plant.	The author of the comment is not aware of any operating experience concerning valve body failure.	X				
ENISS	39	4	83	4.83. The removable parts (like …) present the most significant potential for failures that lead to the production of a missile that should be taken into consideration.	Please add some examples because apart stem, which part present a potential that could generate a missile? (see comment on §4.91-4.94)		X The removable parts (e.g. stem, valve bonnet, motor) present the most significant potential for failures that lead to the production of a missile that should be taken into consideration.		Better formulation.	
China	20	4	86	Please clarify what kind of demonstration may be needed by adopting this approach.	We are wondering whether some specific manufacturer justification report is needed or the operating experience feedback is enough.			X	Please refer to the response to your comment No. 10.	
ENISS	40	4	86	Add at the beginning of the § or at the end or at §4.87 : 4.86. Credit can be taken from anti-overspeed devices to limit missile energy. Since rotating machinery usually has a structure surrounding the rotating parts, some consideration should be given to the energy loss after failure due to the energy absorbing characteristics of the surrounding structure or casing. To the extent practicable the calculation of the energy losses should be based on empirical relationships developed in tests of similar, carefully defined structures. For the sake of simplicity, an approach considering the stop of rotating parts by the casing could be applied based on operating experience feedback and manufacturer justifications. Alternatively, a conservative approach could be used in which it is assumed that no energy is lost in the interaction of the missile and the casing of rotating machinery.	The role of anti-overspeed devices must be valued in this paragraph. It is said then in §4.97 but it will be better to talk about before. If rotating machinery couldn't produce enough energy (limit to be defined), a missile couldn't be generated. Could be moved in §4.87 if needed.			X	The anti-overspeed device might not be present in all rotating machineries and not in all designs. Furthermore, para. 4.97 (c) and 4.98 address the prevention of overspeed.	
France - IRSN	73	4	86	…To the extent practicable, the calculation of the energy losses should be based on empirical relationships developed in test or similar	A comma is missing	X				

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ENISS	41	4	87	4.87. Missiles from the failure of rotating machinery should be characterized on the basis of their potential for damage ~~and should be included in the evaluation of possible primary and secondary effects.~~	Define clearly secondary effects (See §4.124). The term *"secondary effect"* is employed in the definition of combinations (§2.8 and §3.6) but here it is related to effects.		X Missiles from the failure of rotating machinery should be characterized on the basis of their potential for damage and should be included in the evaluation of possible primary and secondary effects.		See resolution of comment No. 9 The part in red is kept.	
China	21	4	89	Please clarify that is it not credible that the most challenging missiles win land in the wider angle?	The land angle of the most challenging missiles is essential for consequence analysis.			X	The comment is not clear. Para. 4.89 does state that a small number of missiles may land in a wider angle from the plane of rotation; this is why sensitivity studies are necessary.	
France - IRSN	74	4	90	4.90. The prevention of failure of pressure vessels includes general considerations of the first and second level of defence in depth, including conservative design and material choices, high quality in construction, and surveillance both in construction and operation. Regarding overpressure, specific measures relevant to pressure vessels include a reliable system for ~~overpressure~~ protection (e.g. safety relief valves, and the design of vessel anchors or supports).	Surveillance in operation and corresponding actions to return in adequate situation are more relevant for 2nd level. Overpressure is not the only risk concerning rupture.	X				
ENISS	42	4	91	4.91. Valve stems should be designed with features to prevent valve stems from becoming missiles in the event of their failure (see paragraphs 4.81 to 4.83). ... 4.94. Unless this is precluded by other considerations, valve stems should be installed in such a manner that the ejection of the stem or of related parts would not result in an impact of a missile on critical targets.	Nowadays all the valves produced have features to prevent the ejection of the stem. It is a current practice. So which *other* part of a valve could potentially generate a missile (see comment on §4.83 about removable parts)?		X 4.91. Valves should be designed in such a way to prevent removable parts from becoming missiles in the event of their failure (see paragraphs 4.81 to 4.83). 4.94. Unless this is precluded by other considerations, valve removable parts should be installed in such a manner that their ejection would not result in an impact of a missile on critical targets.		See resolution of your comment No. 39.	
Russia - Rosatom	2	4	96	…….Possibility of high speed rotating machines elements rupture can be essentially decreased by a proper organizing of monitoring of operational vibration and using of diagnostic systems preventing typical failures of equipment/	a. It should be stated using of a special vibration diagnostic systems for vibration control of turbines and generators to protect the most severe case of turbines failure consists of loosing of the last stage low pressure part blades followed by its disc rupture. It is known that such a case could cause heavy missiles objects with a huge potential energy flying on a distance of several miles from the power plant site. b. The same refers to the primary loop pump flying wheels and heavy pump blades. Corresponding operational vibration control and analysis can in a high degree protect primary pump failure creates missile objects.			X	Please refer to para. 4.99.	
Iran	11	4	97	(c)... equipment for the detection and prevention of overspeed, ... vibrations	Adding item vibrations			X	The bullet c) is only about overspeed. The concern about vibration is addressed in para. 4.99.	
France - IRSN	75	4	99	It should be noted that, while engineering solutions are available to limit speed and to prevent missiles due to overspeed, …	A comma is missing	X				
UK	66 (BAE)	4	99	Additional text…"parameters (such as vibration) and comprehensive in-service inspection. Rotating plant should be maintained and replaced in accordance with manufacturer's instructions.	Components may have a "working life" which should not be exceeded.		X Rotating plant equipment should be maintained and replaced in accordance with manufacturer's instructions.		Integrated resolution considering other comments..	
Germany	36	4	103	Design of barriers requires the consideration of both local and general effects of missiles on the barrier, as follows: *Concrete and reinforced concrete barriers* : - Design of …; - Elastoplastic, ductile …; - The design of …; - There should be an analysis to ensure that the missile will not cause scabbing at the safe side of the barrier or spalling and the concrete fragments will not impact SSCs important to safety; - Generation of …; - Analysis of the penetration depth, spalling and scabbing phenomena can be performed using empirical formulas.	Spalling should also be taken into account in the analysis as mentioned later in the empirical formulas.	X				
Mexico	18	4	103	I suggest to include some reference that can be taken into a count as a base in all that formulas that were mentioned to mitigate the deformation barriers.				X	A safety guide should stay sufficiently general and not to suggest references and formulas. This is the matter for a TECDOC.	
Mexico	19	4	104	...to demonstrate that the impact and its potential secondary effects do not preclude the safety requirements from being met.	To prevent has different meanings.	X				
Iran	12	4	105	Modes of failure of a pressure vessel will depend upon a variety of parameters, including the design, the materials of construction, weld details and quality control in manufacture and operating conditions.	Adding item: operating conditions	X				
Poland	13	4	107	"Features that can retain energetic flying missiles resulting from the rupture of valves, or which will deflect such missiles into a harmless direction, should be considered in the design (which design?). This could include walls or local missile barriers."	It is unclear which design is considered here: design of valves, design of compartment, or design of surrounding equipment and SSC's? Proper clarification should be provided in the guide.			X	Is there any non-flying missile? Please keep in mind that we are addressing the design of the NPP in general.	
Poland	14	4	108	"Features that can retain energetic missiles resulting from the failure of rotating machinery, or which will deflect such missiles into a harmless direction, should be considered in the design (which design?).	It is unclear which design is considered here: design of rotating machinery, design of compartment, or design of surrounding equipment and SSC's? Proper clarification should be provided in the guide.			X	See previous Poland comment.	77, same as FR87 and UK73
China	22	4	109	Please clarify if the dynamic effects of low energy pipes should be evaluated.			X		Yes, but they are expected to be less significant as for high energy piping. A simple bounding analysis would be sufficient.	
ENISS	43	4	109	4.109. Depending on the characteristics of the pipes under consideration (internal parameters, diameter, stress values, fatigue factors), the following types of failure should be considered: (a) High energy pipes (except for those qualified for leak-before-break, break preclusion or for low probability of failure) can suffer from circumferential rupture or longitudinal through-wall crack, or both. The high energy of the contained fluid means that dynamic effects~~,~~ (such as pipe whip, or jet impingement~~,~~) ~~is more important,~~ and flooding should be considered. (b) Low energy pipes can also suffer through wall cracks, either longitudinal or circumferential, although cracks would in some cases be more stable, given the energy of the fluid, and dynamic effects would be less significant. By exception, for low energy pipes4, it could be possible to justify limiting the break size to that of a leak with limited area.	The effect of flooding is to be considered too.		X (a) High energy pipes (except for those qualified for leak-before-break, break preclusion or for low probability of failure) can suffer from circumferential rupture or longitudinal through-wall crack, or both. The high energy of the contained fluid means that dynamic effects~~,~~ such as pipe whip or jet impingement,~~,~~ are important and should be considered.		To be consistent with para. 4.116. See also Germany comment No.36.	
France - IRSN	76	4	109	4.109. Depending on the characteristics of the pipes under consideration (internal parameters, diameter, stress values, fatigue factors), the following types of failure should be considered: (a) High energy pipes ~~(except for those qualified for leak-before-break, break preclusion or for low probability of failure)~~ can suffer from circumferential rupture or longitudinal through-wall crack, or both. … (b) Low …. 4.110. It may be acceptable to postulate only a limited leak (and not a break) if it can be demonstrated that the piping system considered is operated under 'high energy' parameters for a short period of time (e.g. less than 2% of the total operating time). Some Member States have identified criteria for excluding certain pipe segments from break analysis (see 4.135). Alternatively, assessment of the consequences assuming a …	As discussed during NUSSC 44, it would be better not to mention a list of exception within 4.109 which the recommendation. 4.110 is more relevant and should only mention that some practices exist considering that 4.135 is dedicated to break prevention.	X			Integrated resolution considering also comments from China, ENISS and Germany.	
France - IRSN	77	4	109	A high energy pipe is defined as a pipe with an internal operating pressure of more than 2.0 MPa or an operating temperature of more than 100°C in the case of water. Other limits may apply for other fluids, for example gas at greater than atmospheric pressure.	It would be preferable to put the note 4 on the definition of high energy pipes, that are mentioned first, as it is usually done. Anyway, in the current state, the note 4 is false for low energy pipe ("or" shall be replaced by "and")		X		Please note that the definition proposed by the reviewer for low energy pipe is wrong.	

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Germany	37	4	109	(a) High energy pipes (except for those qualified for leak-before-break, break preclusion or for low probability of failure) can suffer from circumferential rupture or longitudinal through-wall crack, or both. The high energy of the contained fluid means that dynamic effects, such as pipe whip, or jets ~~is more~~ impingement are important.	Clarification,for better understanding: suggest not to use "more" if no comparison is made.	X			See also resolution of other comments	
Germany	38	4	109	(b) Low energy pipes can also suffer through wall cracks, either longitudinal or circumferential, although cracks would ~~in some cases~~ generally be more stable, given the energy of the fluid, and dynamic effects would be less significant. By exception, for low energy pipes, it could be possible to justify limiting the ~~break~~ leak size (no break) to ~~that of a leak with limited~~ an area significantly smaller than their inner cross section.	Membrane stresses are generally lower in low energy piping, making cracks stable. The limited leak size implies that no break occurs. This is a form of break preclusion.	X			See also other comments	
Iran	13	4	109	Depending on the characteristics of the pipes under consideration (internal parameters, diameter, stress values, fatigue factors, Manufacturing materials),	Adding item: Manufacturing materials			X	Manufacturing material is covered by internal parameters	
Japan	9	4	109	A low energy pipe is defined as a pipe with an internal operating pressure of less than 1.92~~.0~~ MPa(g) and an operating temperature of less than ~~100~~ 95°C in the case of water.	To keep a consistency with the 200°F criteria exactly. Ref.) USNRC, NUREG-0800, BTP3-3, App. A defines 95°C (200°F) or 1900 kPa(275 psig) for High Energy Fluid Systems.			X	See definition in NS-G-1.11	
ENISS	44	4	110	4.110. It may be acceptable to postulate only a limited leak (and not a break) if it can be demonstrated that the piping system considered is operated under 'high energy' parameters for a short period of time 5 (e.g. less than 2% of the total operating time or plant lifetime). Alternatively, assessment of the consequences assuming a full pipe rupture can be viewed as a good practice to demonstrate the hazard robustness of the design.	Plant operating time and plant lifetime are different but for the spirit of the definition it is the same: very few % of the time.			X	Considering the life time will reduce the period of time.	
Germany	39	4	110	It may be acceptable to postulate only a limited leak size (~~and not a~~ no break) if it can be demonstrated that the piping system considered is operated under 'high energy' parameters for a short period of time (e.g. less than 2% of the total operating time). Alternatively, an assessment of the consequences assuming a full pipe ~~rupture~~ break can be viewed as a good practice to demonstrate the ~~hazard~~ robustness of the design.	We suggest to use the same terminology (as in 4.109) for the same thing.	X			See also other comments	
Japan	10	4	110	It may be acceptable to postulate only a limited leak (and not a break) if it can be demonstrated that the piping system considered is operated under 'high energy' parameters for a short period of time[5] (e.g. less than 2% of the total operating time). Alternatively, assessment of the consequences assuming a full pipe rupture may ~~can~~ be ~~viewed as a good practice~~ performed to demonstrate the hazard robustness of the design. (Footnote 5) This approach is only applicable in ~~some Member States, in particular those~~ where leak-before-break concept has been accepted.	The meaning of "good practice" is unclear.			X	The use of 'may' suggests authorization. The footnote, the approach is applicable in France but the leak before break concept is not accepted there.	
UK	67 (Framatone)	4	110	5 This approach is only applicable in some Member States, ~~in particular those where leak-before-break has been accepted~~.	There is no logical link between 2% criteria and LBB (Finland, for instance, accepts LBB but not 2%). It is sufficient to recall that it is applicable in some member states. Accepted text and the position of footnote number should move to the closing bracket "(and not a break)5."	X				
WNA	74	4	110	5 This approach is only applicable in some Member States, ~~in particular those where leak-before-break has been accepted~~.	There is no logical link between 2% criteria and LBB (Finland, for instance, accepts LBB but not 2%). It is sufficient to recall that it is applicable in some member states	X				
China	40	4	111	Other locations of potential high stress or fatigue. Specify the scope of "all locations"	If the potential stress or fatigue of the locations is low, it is no need to postulate failure. Lack of definition of "all locations"		X		Integrated resolution taking into account also Germany comment No.41. and France comment No. 76.	
France - IRSN	78	4	111	For a piping system designed and operated according to the rules applied for safety systems : at the terminal ends (fixed points, connections to a large pipe or to a component) and at welds and intermediate points of high stress ; other locations, where the failure would lead to bounding effects on SSCs important for safety, should be verified, possibly with realistic assumptions	For pipes of high quality, the locations of failure can be defined a priori, where the probability of failure is maximum, to limit the number of cases (impact of whip and jet effects). However, a check of other locations, where the failure would lead to bounding effects on SSCs important for safety, should be made with realistic assumptions (no single failure…)		X		Formulation consistent with the structure of the paragraph. Major conflict in the comments among MS.	
Germany	40	4	111	(a) At the terminal ends (fixed points, connections to a larger pipe or to a component) and at welds and intermediate points where failure of ~~a~~ the piping ~~system designed and operated according to the rules applied for safety systems~~ would lead to bounding effects on SSCs important to safety;	There is no reason to assume a system "designed and operated according to the rules applied for safety systems" (i.e. class 2 piping). The idea of looking for bounding effects appears productive and feasible for an internal hazards analysis.			X	No other MS commented on this bullet	
Germany	41	4	111	(b) ~~In all locations for other pipes.~~	"other" pipes is not defined as the type of piping in (a) is not restricted. The requirements defined in (a) are considered reasonable for an internal hazard analyses of general large high energy piping.			X	See resolutions of other comments.	
Japan	11	4	111	(b) In all locations for other pipes when.... For small[6] diameter piping systems, breaks should be postulated at all locations ~~because~~ if they are sensitive to vibration-induced failure.	Clarification for the scope of postulated pipe break and differences between break, failure and rupture. Para. 4.111. (b) states failure should be postulated in all locations for other pipes besides the terminal ends and others, and para. 4.112. also states breaks should be postulated at all locations of small diameter pipes. The scope of postulated pipe break is unclear. In general, conditions such as 2.4 Sm and/or CUF 0.1 should be added to be able to exclude some locations from all locations of other pipes. Para. 4.112 refers to only vibration-induced failure, but other factors, e.g. stress, erosion/corrosion, should be assessed.		X		Please refer to the integrated resolution considering other comments.	
China	41	4	112	"For small diameter pi ping systems, ..." proposed to be "For small diameter (except the nominal diameter of less than 25mm) piping systems "	The small diameter should exclude the nominal diameter of less than 25mm		X		Complete the footnote by adding "In other Member States, pipes with nominal diameter of 25 mm or less are considered small".	
Germany	42	4	112	For small diameter piping systems, breaks should be postulated at ~~all~~ any location~~s~~ because they are sensitive to vibration-induced failure and to rupture due to external forces.	"any" is editorial. The reasons for the sensitivity might be eliminated, yet if they are described, there are two important factors, and we suggest to mention both of them	X				
Spain	1	4	112	For small[6] diameter piping systems, breaks should be postulated at all locations because they are sensitive to vibration-induced failure, unless there is an alternative based on current regulations accepted by the regulatory bodies.	In this point it is indicated that breaks in small diameter pipes (nominal diameter of 50 mm or less) should be considered as being sensitive to vibration induced failures. In the licensed analyses only breaks in lines of more than 1" are considered. An alternative should be given based on current regulations accepted by the regulatory bodies.			X	The proposed text appears inappropriate as "current regulations accepted by the regulatory bodies" is questionable. Indeed, regulations are normally developed by the regulatory body and hence accepted by that regulatory body.	
Germany	43	4	113	A circumferential pipe rupture might result from damage by a degradation ~~failure~~ mechanism such as corrosion or fatigue (i.e. a crack growing over its critical size) or an acute ~~stress such as~~ overload e.g. by water hammer or impact due to the rupture of other piping. The most probable location of such a pipe rupture is any circumferential weld between the straight pipe parts and the pipe components such as pipe bends, T intersections, reducers, valves or pumps. In general, pipe rupture should be considered wherever there are changes in stiffness and vibration or fluid stratification caused by temperature differences.	Clarification	X				

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
France - IRSN	79	4	114	4.114. The estimated frequency of a double ended guillotine break of high energy piping should be derived from operating experience or fracture mechanics calculations.	The calculation of this frequency is not always necessary and not applicable in all countries	X				
Japan	12	4	114	The frequency of a double ended guillotine break of high energy piping should be derived from operating experience or fracture mechanics calculations. This frequency might also be available from evaluations made for the purposes of probabilistic safety assessment.	Some explanation is needed on how the derived frequency is used. The evaluation of internal hazards in this guide is performed on the basis of deterministic assumption. This paragraph does not give any assistances for the evaluation of pipe breaks.			X	Evaluation of internal hazards is not based only on deterministic considerations. Please refer to Paragraphs 3.5, 3.26, etc.	
ENISS	45	4	116	4.116. Complete instantaneous breaks of high energy pipes should be postulated. The consequences of breaks in these pipes include, in addition to whip and jet effects, flooding and increases in pressure, humidity, temperature, radiation, and possibly debris generation. These effects should be taken into consideration when designing relevant SSCs important to safety.	Don't forget the major phenomena.		X		Better formulation in taking into account Finland comment No. 13, and separation in local effects, and global effects.	79, same as FR88
Finland	13	4	116		Please clarify; Is there an intent to have two separate list with different scope 4.116/4.117. The list of effects is somewhat redundant with the list of 4.117.		X 4.116. Complete instantaneous breaks of high energy pipes should be postulated when analysing local effects on SSCs important to safety, such as direct mechanical contact (pipe whip) or jet impingement including potential blast wave load. Furthermore, the global effects of breaks in these pipes, including the consequences of breaks in these pipes, such as flooding, increases in humidity, increases in temperature, asphyxiant effects, and higher radiation levels should be taken into consideration when designing the supports, the protection means (e.g. pipe restraints) and the relevant SSCs important to safety.		Integrated resolution to consider other similar comments. Please refer to the new paragraphs 4.116 and 4.117.	
Germany	44	4	116	Complete instantaneous breaks of high energy pipes should be postulated, when analyzing local effects on SSCs important to safety, such as direct mechanical contact (pipe whip) or jet impingement. Furthermore, the global effects ~~The consequences~~ of breaks in these pipes ~~include~~ including flooding and increases in pressure, humidity, temperature, radiation, ~~and~~ possibly debris generation, and asphyxiant effects ~~. These effects~~ should be taken into consideration when designing relevant SSCs important to safety.	The assumption of ccomplete instantaneous breaks is important for the analysis of the local effects. Therefore they should be mentioned in this context – separated from the design of the SSCs themselves. SSCs should be designed to withstand the "global" effects. "asphyxiant effects" where transferred to this part, as our suggestion is to delete them from 4.117.		X Complete instantaneous breaks of high energy pipes should be postulated when analysing local effects on SSCs important to safety, such as direct mechanical contact (pipe whip) or jet impingement including potential blast wave load. Furthermore, the global effects of breaks in these pipes, including the consequences of breaks in these pipes, such as flooding, increases in humidity, increases in temperature, asphyxiant effects, and higher radiation levels should be taken into consideration when designing the supports, the protection means (e.g. pipe restraints) and the relevant SSCs important to safety.		Integrated resolution considering other similar comments.	
Finland	14	4	117		Please clarify; Is there an intent to have two separate list with different scope 4.116/4.117. The list of effects is somewhat redundant with the list of 4.116.		X 4.117. Pipe failures could have an impact on SSCs important to safety by means of both, the abovementioned local and global effects. All these possible effects should be analysed and considered in the plant design, in particular for protective and mitigative measures.		See previous comment.	
Germany	45	4	117	Pipe failures could have an impact on SSCs important to safety by means of both, the abovementioned local and global effects. ~~, such as direct mechanical contact (pipe whip) or jet impingement, as well as global effects, such as flooding, increases in humidity, increases in temperature, asphyxiant effects and higher radiation levels. These~~ All these possible effects should be analysed and considered in plant design, in particular for protective and mitigating measures.	The measures all together should protect against or mitigate all effects of pipe breaks.	X				
USA	8	4	117	Revise to read: "Pipe failures could have an impact on SSCs important to safety by means of local effects, such as direct mechanical contact (pipe whip) or jet impingement *including potential blast wave load,* as well as global effects and higher radiation levels. These possible effects should be analyzed."	Draft safety guide DS 494 did not explicitly identify the potential blast wave load as a local effect resulting from postulated pipe failures. However, in the event of a high-pressure pipe rupture, the first significant fluid load on surrounding structures, systems, and components would be induced by a blast wave.	X				
China	23	4	120	In this paragraph, the expression "at the same elevation" is ambiguous. Does it mean at the same plane or at the same horizontal level?			X For assumed breaks where the full length of both pipe segments are at the same elevation, the pipe whip should be assumed to occur only at the same elevation; otherwise, motion in all directions (i.e. a sphere centered on the plastic hinge) should be assumed.		Integrated resolution of similar comments.	
Germany	46	4	120	For assumed breaks where the full length of both pipe segments are at the same elevation, the pipe whip should be assumed to occur only at the same elevation; otherwise, motion in all directions (i.e. a sphere centered on the plastic hinge) should be assumed.	It should be clear that the full length of the piping run until the terminal ends or any fixed point has to be at the same elevation.	X			See also Chinese comment No. 23.	
ENISS	46	4	123	4.123. For the analysis of the consequences of an impact, it should be assumed that any impact of a whipping pipe onto a pipe of similar design but smaller diameter than the impacting pipe in general results in damage (a break) to the target pipe. Impacted target pipes of a diameter equal to or larger than the impacting pipe need not be assumed to lose their integrity. However, if an additional mass (such as a valve or an orifice plate) is present on the whipping branch, the kinetic energy of the motion is increased. Additionally, the stiffness of the pipe ~~- and therefore its capacity to damage a larger pipe -~~ might increase if there is a change in pipe shape (e.g. an elbow) near the end of the pipe. In these cases the ~~target pipe could be broken even if it is larger than the whipping pipe.~~ the risk of failures could be specifically analyzed. Cables and cable trays should be considered as possible targets if they support systems or components important to safety.	It's important to give a technical justification or a technical reference regarding this assumption. It seems like there is a general rule and an exception that suppose a dedicated analysis.			X	The wording is cautious (use of might and could). In particular, it is stated that the consequences of failures could be analyzed.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Finland	15	4	123	For the analysis of the consequences of an impact, it should be assumed that any impact of a whipping pipe onto a pipe of similar design but smaller diameter than the impacting pipe in general results in damage (a break) to the target pipe. Impacted target pipes of a diameter equal to or larger than the impacting pipe need not be assumed to lose their integrity. However, if an additional mass (such as a valve or an orifice plate) is present on the whipping branch, the kinetic energy of the motion is increased. Additionally, the stiffness of the pipe – and therefore its capacity to damage a larger pipe - might increase if there is a change in pipe shape (e.g. an elbow) near the end of the pipe. In these cases the target pipe could be broken even if it is larger than the whipping pipe. Cables and cable trays, different type of structures and instrumentation should be considered as possible targets if they support systems or components important to safety.	Add: different types of structures and instrumentation Targets of pipe whip could be also different types of structures and instrumentation.	X			.	
ENISS	47	4	124	4.124. In the investigation of the whipping pipe, consideration should be given to the potential for a subsequent break after an impact on a target, with the ejection of secondary missiles. In most cases, those scenarios are not considered credible. Sources of missiles could be single concentrated masses within or attached to a pipe branch, such as valves and pumps or heavy form parts. If these components have separate supports by design to prevent such breaks and the formation of secondary missiles, the analysis should be extended to these anchor points. Attention should also be paid to instrumentation wells and similar attachments to the pipe as further possible sources of missiles.	Those scenarios of formation of secondary missiles are not considered credible and therefore not studied in many countries.			X	Only credible hazards are considered in this safety guide. Furthermore, see ENISS comment No. 8.	
UK	68 (BAE)	4	129	Added "(e.g. pressure, temperature, density)	Query – Should the density of the fluid be considered as a physical parameter? The density of the fluid would affect the inertia of the stream.	X				
China	24	4	130	The case that there is more than one jet is more complicated, and could you please give more detailed description on the interference of the jets? This is the case of the double ended break of a pipe with restrains	If the break of a pipe without restrains, the frequency of occurrence of the interference of the jets is low, so that can be ignored.			X	There is no proposal of alternative text and the comment is not clear.	
Mexico	20	4	130	This is the case of the double ended break of a pipe without restraints.	Is necessary more information about de term "pipe without restrains".			X	This is clear enough.	52, same as FR48 and UK45
China	25	4	131	Please give more details on the effect of the motion of the jet's source.				X	More detailed guidance is out of the scope of this safety guide, but could be the subject of detailed documents like Tecdocs or safety reports.	
Mexico	21	4	132	Conservative analysis using either an verified computer model...	Is there any recommendation or references about the models used for this analysis?			X	Please see answer to Mexico comment No.18.	
ENISS	48	4	133	4.133. The following effects of jets on targets should be taken into account if considered credible and useful: mechanical load (pressure, impact), thermal load (temperature, including thermal stresses and shocks where appropriate) and properties of fluids (such as possible short circuits in electric equipment due to the conductivity of liquid water). Possible chemical effects should also be evaluated, particularly if the fluid ejected is other than water.	Based on expert judgement, the effects considered as credible are taken into account. .			X	See resolution of previous comment.	
France - IRSN	80	4	135	4.135. ~~Very high quality standards for high energy piping should be applied in order to reduce the likelihood of pipe failures~~. Some Member States have identified criteria for excluding certain pipe segments from break analysis	"Very high quality standards" is not clear, provides no guidance and are therefore not sufficient		X In some Member States, it has been judged that the application of very high quality standards for high energy piping, similar to those for vessels, could reduce the risk of pipe breaks to such a low level that it can be effectively excluded.. Some Member States have identified criteria for excluding certain pipe segments from break analysis[1].		This new proposal is adapted from NS-G-1.11. It is recognized that this is sensitive point but removing the first sentence and leaving only one sentence for the para. 4.135 is questionable.	
Poland	15	4	135	"~~Very high quality~~ Applicable nuclear industry codes and standards for high energy piping should be applied in order to reduce the likelihood of pipe failures. Some Member States have identified criteria for excluding certain pipe segments from break analysis."	It is unclear what should be understandable as a "very high quality standard". Are we speaking here about nuclear industry codes and standards? It should be clarified, what should be acceptable as very high quality standard and who has the competence to declare one standard lower quality than other. Otherwise text should be revised and corrected.			X	The meaning here is to stress the quality and not to compare the standards.	
France - IRSN	81	4	136	~~4.136. For locations where break preclusion criteria are met, a leak (rather than a complete rupture) may be assumed. To determine the leak size, a fracture mechanics analysis should be performed. Alternatively, a suberitical crack corresponding to a leak size of 10% of the flow cross-section should be postulated. The leak detection system should be shown to have a sensitivity that is adequate to detect the minimum leakage from a crack that is just suberitical.~~	As written, 4.136 means that break preclusion is always possible. It is not a position shared in every countries. Moreover, there is an inadequate mixture of BP and LBB			X	This is a conflictual paragraph on which there are different views. The initial proposal comes from NS-G-1.11 and was not commented by other Member States. The reviewer does not make any alternative proposal.	
France - IRSN	82	4	137	4.137. For all piping the ~~probability~~ likelihood of a pipe break can be reduced significantly if adequate ~~additional~~ safety orientated measures are applied, notably for design, manufacturing, construction and surveillance ~~measures~~ (increased in-service inspections or monitoring for leakage, vibration and fatigue, water chemistry, loose parts, displacements, and erosion and corrosion).	"probability" may be interpreted as a probabilistic demonstration Additional is not clear Surveillance is not sufficient and the proposal tries to capture the potential idea of 4.135	X				
Russia - Rosatom	1	4	137	….Monitoring of elevated operational vibration of high energy piping should include fatigue analysis and walkdowns of piping itself and state of supporting system on definition of cracks, wear, etc. (e.g. Ref OM3 ASME)	It should be clearly defined that in many cases piping rupture and piping whip is connected with a long term high level of piping operational vibration.Thus it should be recommended to arrange a vibration control and analyzing of piping operational vibration for the main high energy and safety related piping considering possible interaction of safety related with non-safety related systems, components and equipment.			X	Please note that these surveillance measures are clearly mentioned in lines 2 and 3 of para. 4.137	
France - IRSN	83	4	138	4.138. ~~The likelihood of a severe pipe rupture in the piping systems of a nuclear power plant is generally accepted to be low; however~~ Once a pipe has broken, pipe whip should be assessed and pipe restraints should be used to restrict the motion of pipes that, if broken, could impact SSCs important to safety.	Not consistent with 4.135 where it is written that some MS exclude some break. Proposal is consistent with 4.139		X (rewording necessary)	X	Final resolution will be done once para. 4.109, 4.110, 4.111 and 4.136 have been updated.	
Mexico	22	4	138	The likelihood of a severe pipe rupture in the piping systems of a nuclear power plant is generally accepted to be low; however pipe restraints should be used to restrict the motion of pipes that, if broken, could impact SSCs important to safety.	Is this the only mitigation for all pipe whip?			X	Is this a comment or a question?	
France - IRSN	84	4	139		Consider deletion of "vessel" (not relevant in a chapter related to pipe breaks (title in page 37)	X				
UK	69 (BAE)	4	142	added "e.g. due to the steam released by"	Steam implies this is a water-carrying pipe. If steam, would it be better to use some mention of water in the sentence?		X for example due to the steam released …		Better formulation that avoids two successive e.g.	
China	26	4	144	It is recognized that external flooding will not exacerbate internal flooding because the site boundary will be designed to resist external flooding.				X	This is true only if the design against external flooding is correct.	62, same as FR58

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Finland	16	4	144	Internal flooding can be caused by any event that results in the release of a liquid, usually water9 that exceeds the capacity of the evacuation in a given area. Flooding can lead to a loss of multiple SSCs that are not designed to be submerged or exposed to spray. Although the guidance in this section is limited to internal flooding, it should be recognized that external events (e.g. earthquake, external flooding) can cause or exacerbate internal flooding.	clarity	X				
China	27	4	145	The reason for the consideration of water collecting in cable trays is not clear, so please clarify the impact to the nuclear safety, does that exist some feedbacks in existing reactors?				X	The comment is not clear. Regarding impact on safety, water from spray or condensed steam may cause a flooding or may be drained to places where electrical shorting will cause plant unavailability, and potentially other hazards.	
China	28	4	146	Please clarify the plant personnel actions that can lead to flooding, not only the maintenance activities included.	Please supplement more information about plant personnel actions.			X	Other examples could be mal-operation of valves by plant personnel during testing or poor configuration control of water bearing systems.	
Finland	9	4	147	A flood can be caused by a leak or a break of any water carrying system. Examples of events that could cause a flood include but are not limited to: − A leak or break of the primary or secondary system; − A leak or break of the emergency core cooling system; − A leak or break of the service water system; − A leak, break, or spurious operation of the fire water system; − Human error during maintenance (e.g. leaving a valve, an access hole or a flange open by mistake).	clarity and better order of recommendation and examples.			X	Rather accept the comment No. 17.	
Finland	17	4	147	Examples of events that could cause a flood include but are not limited to: − A leak or break of the primary or secondary system; − A leak or break of the emergency core cooling system; − A leak or break of the any water carrying system; − A leak, break, or spurious operation of the fire water system; − Human error during maintenance (e.g. leaving a valve, an access hole or a flange open by mistake).	clarity the example should not be limited to service water system.		X A leak or break of any water carrying system;		Combine with other comments (e.g. Japan comment). Note it was already addressed in comment 9!	
Japan	13	4	147	- Examples of events that could cause a flood include but are not limited to: A leak or break of the primary or secondary system; A leak or break of the emergency core cooling system; A leak or break of the service water system; A leak, break, or spurious operation of the fire water system; Human error during maintenance (e.g. leaving a valve, an access hole or a flange open by mistake). A leak or break of the tanks and/or pipes in the site area; Flood by sloshing in the SFP at earthquake; Flood by rainwater.	We propose to add some more examples based on the operating experience in our country.		X		This is not an exhaustive list. Some of the proposed list are too specific. and the case of 'A leak or break of the tanks and/or pipes in the site area' is now covered by 'A leak or break of any water carrying system'	
Finland	18	4	148	All possible flood hazards should be systematically identified. One approach is to list SSCs and then to identify all the possible sources of water including sources in other rooms and systematic identification of flood propagation pathways. This identification should be supported by room walk-downs for verification. A 3D-model should also be used for V&V purposes.	Add: identification of flood propagation pathways systematically A 3D-model should also be used for V&V purposes. systematic identification of flood propagation ways is also needed. A 3D model is useful tool for these purposes.		X All possible flood hazards should be systematically identified. One approach is to list SSCs and then to identify all the possible sources of water including sources in other rooms and systematic identification of flood propagation pathways. This identification should be supported by room walk-downs for verification. A 3D-model could also be used for V&V purposes.		Better formulation highlighting the fact that the use of a 3-D model is an example of means by using 'could' instead of 'should'.	
China	6	4	149	For all possible flood scenarios, a water level as a function of time should be determined not only for the room or plant area with the source of the water but also for all rooms or plant areas to which the water could spread. This should take into account the source's overall inventory, location and size of break, discharge rates and means of isolation. Possible inexhaustible water supplies should also be considered. Typical pathways that flood water could traverse include pipe conduits, drains, or openings in walls or floors, stairwells, vents, elevators. Doors are also an important flood propagation pathway.	The location and size of break determine the discharge rate and the water spread pathway.			X	Rejected because if location and size of the break provide the discharge rate, then the latter should not be repeated. source covers the location and discharge rate is there (we do not need location and size to determine the discharge rate).	
China	29	4	151	Please clarify what is the definition of spray, for example, does it mean jet impingement, retention of water?	The "spray" can have different meanings and understandings.			X	Spray is clear and does not need further explanation; means spread of water; no jet impingement is considered in para. 4.151. Spray should be considered because some electrical components are vulnerable to water even if they are not submerged.	
Poland	16	4	154	"If the liquid is water, flooding is usually considered to be of concern mainly for electrical devices, which should be assumed to fail if submerged or subject to spray, unless qualified for these conditions…"	Flooding might be hazardous not only for electrical devices, but for nuclear power plant dry fresh fuel storage and spent fuel casks dry interim storage. Nuclear safety aspects of flooding dry fresh and spent fuel storages should be explained and proper recommendations should be provided in the guide: 1) how to protect dry fresh and dry spent fuel storages from internal flooding; 2) how to detect flooding. It should be noted, that information provided in the paragraph 4.163 are not sufficient and are not specific for proper protection measures development for dry fuel storages.			X	This is addressed in another safety guide DS487.	
China	30	4	155	Please give more detailed guidance on the effect of buoyancy on mechanical equipment.	This is new in this guidance, and further information is needed to execute in later design.			X	This is not new as it is included in NS-G-1.11, page 8, bullet (d). Moreover, a detailed guidance is out of the scope of this safety guide.	
Finland	19	4	155	Mechanical equipment could not be directly affected by water but often relies on electrical support equipment (e.g. power, instrumentation, control) and the effect of flooding on this support equipment should be considered. Additionally, the effect of buoyancy should be considered since mechanical equipment might not be designed to withstand an upward force.	Please clarify and reformulate / grammar. Generally the mechanical and electrical equipment should be qualified for the same environmental conditions. Mechanical equipment may be resistant to the direct effects of water but it often relies on electrical equipment. There are two very different phenomena discussed. Please make two separate paragraphs.		X Some mechanical equipment is resistant to the direct effects of water, but relies on electrical support equipment (e.g. power, instrumentation, control). In this case, the effect of flooding on this support equipment should be considered. Additionally, the effect of buoyancy should be considered since mechanical equipment might not be designed to withstand an upward force.		Wording improved.	
China	31	4	164	Please clarify the consideration about the environmental conditions and the relationship with time.			X		Please refer to the consolidated paragraph 4.164 taking into account the French proposal in comment No.85.	
France - IRSN	85	4	164	In the deterministic approach, the most limiting single failure should be assumed for detection or ~~isolation~~ action (e.g isolation) and conservative plant personnel action times should be assumed considering the environmental and ambient conditions due to flooding.	Isolation is an example of action: other action could be foreseen (e.g. draining in a capacity,...) depending on the process. Environmental and ambient conditions due to flooding can induce delay for action.		X In the deterministic approach, the most limiting single failure should be assumed for detection or ~~isolation~~ action (e.g isolation) and conservative plant personnel action times should be assumed considering the environmental conditions due to flooding.			66, same as FR63

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
UK	70 (Framatone)	4	164	In the deterministic approach, the most limiting single failure should be assumed for detection or ~~isolation~~ action (e.g isolation) and conservative plant personnel action times should be assumed considering the environmental and ambient conditions due to flooding.	Isolation is an example of action: other action could be foreseen (e.g. draining in a capacity,...) depending on the process. Environmental and ambient conditions due to flooding can induce delay for action.		X In the deterministic approach, the most limiting single failure should be assumed for detection or ~~isolation~~ action (e.g isolation) and conservative plant personnel action times should be assumed considering the environmental conditions due to flooding.			
WNA	75	4	164	In the deterministic approach, the most limiting single failure should be assumed for detection or ~~isolation~~ action (e.g isolation) and conservative plant personnel action times should be assumed considering the environmental and ambient conditions due to flooding.	Isolation is an example of action: other action could be foreseen (e.g. draining in a capacity,...) depending on the process. Environmental and ambient conditions due to flooding can induce delay for action.		X In the deterministic approach, the most limiting single failure should be assumed for detection or ~~isolation~~ action (e.g isolation) and conservative plant personnel action times should be assumed considering the environmental conditions due to flooding.		Integrated resolution of similar comments.	
China	32	4	166	Please clarify the minimum flow rate that is considered as "fast enough". And please give more detailed guidance on dynamic analysis?	"Fast enough" is not sufficient to execute in design.			X	Safety guides do not provide figures to execute the design. One example was given in para. 4.166.	
China	42	4	167	Drains should not be considered as an important protective feature against flooding. Drainage system is just used to drain the potential water in the room during the normal operation, and collect the water into different tanks according to the different character.The system does not consider the need of a flood condition.	If we should consider the need of the flooding, the process capacity of the drainage system will become much bigger than the systems .			X	Drains are an important flood protection feature even if their capacity is lower than the rate at which water is flowing into a room. In fact, Paragraph 4.144 specifically describes internal flooding as an event that results in the release of a liquid at a rate that exceeds the capacity of evacuation (removal) in a given area. In these circumstances, drains can slow the rate that water level in the room is rising, which provides time for operators to identify and mitigate the flood	
Finland	20	4	167	Drains are an important protective feature against flooding because they limit the rate that water rises during a flood, which provides time to the plant personnel to take appropriate actions. The drain system should be designed with a capacity (i.e. drainage rate) suitable for the internal flooding sources in each plant area. To the extent practicable, the drainage system should be designed in a manner that facilitates inspection and maintenance to limit the likelihood of clogging. Administrative controls should be used to ensure that temporary equipment that could clog drains (e.g. plastic sheeting) is not stored in a location that could transport to drains were a flood to occur. Design provisions (e.g. drains equipped with check valves) should be used to ensure that flood water from one area does not travel backwards causing a flood in another area, thus compromising the segregation of SSCs important to safety.	Please note and clarify. It should be noted that drains are usually designed for small and/or controlled leaks. They are generally not designed to mitigate floods from breaks		X		Consistency with DS440 and with other comments.	
Japan	14	4	167	Administrative controls should be used to ensure that temporary equipment that could clog drains (e.g. plastic sheeting) is not stored in a location that could transport to drains if ~~were~~ a flood were to occur.	Editorial.	X				
France - IRSN	86	4	168	Special considerations should apply for potential release of dissolved hydrogen in water and for fluids other than water (e.g. chemicals used for fire suppression).	Hydrogen can be present in the water of some process systems.	X				
UK	71 (Framatone)	4	168	Special considerations should apply for potential release of dissolved hydrogen in water and for fluids other than water (e.g. chemicals used for fire suppression).	Hydrogen can be present in the water of some process systems.	X				
WNA	76	4	168	Special considerations should apply for potential release of dissolved hydrogen in water and for fluids other than water (e.g. chemicals used for fire suppression).	Hydrogen can be present in the water of some process systems.	X				61 (identical comment as for FR67; however proposed texts are different)
ENISS	50	4	169	4.169. The design should account for the fact that water present during an internal flood could impose a hydrostatic load on those SSCs in contact with the water (e.g. doors, walls, floors, penetrations). If not properly accounted for, this could lead to structural failures and damage from heavy ~~falling~~ materials drop. It could also lead to failure of barriers and doors important to hazard protection.	See comment on 4.172		X 4.169. The design should account for the fact that water present during an internal flood could impose a hydrostatic load on those SSCs in contact with the water (e.g. doors, walls, floors, penetrations). If not properly accounted for, this could lead to structural failures and damage from falling objects or heavy ~~falling~~ load drop. It could also lead to failure of barriers and doors important to hazard protection.		Falling objects is the wording in SSR-2/1 (see Requirement 17, para. 5.16).	
ENISS	49	4	171	~~4.171. Leakages from systems used in the long term for extracting heat from the containment during severe accidents should be accounted for. They should be isolatable and the radioactive water and gas released should be confined by appropriate means; in particular, a ventilation system qualified to the corresponding ambient conditions should be available.~~	This § concerns a dedicated analysis regarding the main safety function "confinement" following an accident and it is usually part of the accident analysis. This requirement is not part of the internal hazards safety demonstration. It is proposed to delete the paragraph.			X	Para. 4.171 is continuation of para. 4.170. Moreover, it is not a usual practice to address the leakage from the systems in accident analysis.	
ENISS	51	4	172	~~COLLAPSE OF STRUCTURES, FALLING OBJECTS AND~~ HEAVY LOAD DROP 4.172. Falling objects or structure elements caused by external events such as earthquakes or high winds will be covered under the relevant external hazards. The potential for consequential internal hazards following these drops will follow the guidance given in Appendix I of this guide. Therefore, this section addresses the risk of dropped or impacting loads during their handling.	The title should be changed for this section. As a matter of fact, as §4.172 states, *"falling objects or structure elements caused by events such earthquakes or high winds will be covered under the relevant external hazards"*. Therefore, falling objects following external hazards are not treated in the following §s. Through the internal hazards assessment, only the drop of heavy equipment or equipment handled in specific situations that might induce large consequences are considered. These objects are loads that are handled with specific equipment such as heavy cranes. In consequence, it is relevant to title the section in consistency with its object.		X Collapse of structures, or objects falling from heights can be secondary effects either of an internal hazard or of an external hazard such as earthquakes or high winds. They need to be assessed as potential consequences of the initiating internal or external hazards. In turn, falling objects can cause consequential internal hazards; guidance on these combined consequential hazards is given in Appendix I. The remainder of this safety guide however concentrates on heavy load drop, where no other initiating hazard is necessary.		More complete formulation.	
China	33	4	173	If heavy items of plant equipment located at significant heights are seismic-classified, should it still need to have an evaluation of load drop?	Please give further explanation.			X	Mechanisms, other than earthquake, can lead to heavy load drops and should be considered.	
ENISS	52	4	173	**Identification and characterization of ~~collapse of structures, falling objects and~~ heavy load drop** 4.173. Drops are more likely to occur from the handling of plant equipment for maintenance or from fuel handling lifts. If heavy items of plant equipment are located at significant heights, an evaluation should be made of the possible hazards associated with dropping such equipment, if the probability of this event is not negligible. The consequences of ~~collapse of structures, falling objects or~~ heavy load drops should be assessed, and these could present a risk to safety in several ways: (a) As an impact on the fuel (risk of release of radioactive material and potentially of criticality); (b) As an impact on components of safety systems (risk of failure of systems); (c) As an impact on structures important to safety (for example, risk of loss of integrity of fuel pools and of release of radioactive material).	See comments on §4.172	X				

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
China	34	4	174	In the event of a fuel drop or other item drops onto the fuel assembly, please clarify whether to consider only the damage of one set of fuel assemblies or !O consider the damage of multiple sets of fuel assemblies	Please give some examples or further explanation.			X	References are provided where to find further information.	
ENISS	53	4	175	4.175. The nature of the object and the cause of its dropping should be analysed in order to characterize the possible direction, size, shape and energy of the falling object and their possible consequences for safety~~10~~. When a dropped load is determined to be sufficiently improbable, i.e. for handling devices that are designed and constructed by means of extremely comprehensive and thorough practices and with an adapted surveillance program during commissioning and operation, it can be ruled out from the design. In the particular case of the polar crane, cases could be assessed using realistic assumptions as they are determined to be sufficiently improbable.	Delete the footnote 10 and add the proposed complements.			X	Only credible hazards are addressed. There is no need to move the footnote to the text. The footnote is only a complement of information.	
Germany	47	4	175	The nature of the object and the cause of its dropping should be analysed in order to characterize the possible direction (e.g. from drop, tilting or swinging), size, shape and energy of the falling object and their possible consequences for safety.	It is unclear if toppled heavy loads and swinging heavy loads are also covered. The analysis may have to be performed until kinetic energy is used to cause no further damage.	X				
ENISS	54	4	178	**Prevention of ~~collapse of structures, falling objects and~~ heavy load drop** 4.178. Functional design requirements …	See comments on §4.172	X				
Germany	48	4	178	Prevention of collapse of structures and falling objects should include the classification of structures and objects which could collapse or fall, design measures and administrative measures, as follows: a) Classification of structures and objects in accordance with the results of a hazard analysis that evaluates the consequences of a postulated collapse of structure and falling object from the considered structure or object; b) Design: − The general considerations of the first level of defence in depth, including conservative design and material choices, high quality in construction, and surveillance both in construction and operation; c) Administrative measures: − Attention should be paid to temporary installations in the vicinity of SSCs; − Attention should be paid to the periodic inspection and maintenance of support structures."	In addition to the preventive measures for dropped loads similar measures should be specified for falling objects, i.e. classification of support structures, design requirements and administrative measures concerning periodic inspections and maintenance.			X	This section is now focusing on load drop.	72, same as FR70 and UK63
ENISS	55	4	182	**Mitigation of ~~collapse of structures, falling objects and~~ heavy load drop** 4.182. A significant mitigation of risks from dropped ~~or falling~~ loads is provided by scheduling load movements and lifts only in specified modes of plant operation (such as shutdown modes). Such scheduling could be also used as a preventive measure.	See comments on §4.172 (and consistency)	X				
China	35	4	183	Can you give some explanations about this paragraph? If the spent fuel cask taken the stepped approach, which value is the suggested maximum height of a single step? Please specify this value.	The text seems ambiguous, and it is hard for me to understand. So please give some examples or further explanation.			X	The maximum height of a single step is case dependent. Moreover, this safety guide does not provide numerical acceptance values.	
ENISS	56	4	183	4.183. The consequences of ~~large~~ heavy load drops can in some cases be reduced by adopting a stepped approach so that the lift is over intermediate points, by load following platforms, or by deformable structures at the point of the lift.	See comments on §4.172 (and consistency)	X				
Poland	17	4	183	"The consequences of large drops can in some cases be reduced by adopting a stepped approach so that the lift is over intermediate points, by load following platforms, or by deformable structures at the point of the lift and by using dampers on the lifted heavy load."	For the mitigation of consequences of accidental heavy load drop can be used not only deformable structures under the point of lift, but also protective dampers installed on heavy load or other cargo. For example, such protective dampers are used on spent fuel casks.		X Protective dampers installed on heavy load could be also used. For example, such are used on spent fuel casks		More concise formulation	73, same as UK64
Poland	18	4	184	"In the particular case crane loads associated with fuel handling such as fuel shipping casks, attention should be paid to the fuel casks since they are massive and the possible consequences of drops affecting the fuel storage pool should be controlled."	This paragraph provides the concern related with fuel casks handling operations and crane loads, but does not provide any recommendation regarding protective measures. The recommendation for fuel casks protection by dampers should be provided in the guide (see also comment for paragraph 4.183).			X	See resolution of comment No. 16.	
UK	72 (BAE)	4	184	Query – Could a dropped flask cause a release of pond water over the edge of the pond into other areas of plant?	This could be due to the wave generated by water displacement. ONR considers that additional text may be developed to address this query			X	The volume of the cask is not so important, so the volume of water that could go out of the pond remains very limited.	
ENISS	57	4	185	~~4.185. An additional design objective for plant layout should be to protect stored fuel or other items important to safety from any dropped loads~~. *or* ~~4.185~~ 4.181 b). An additional design objective for plant layout should be to protect stored fuel or other items important to safety from the drop of heavy equipment or equipment handled in specific situations that might induce large consequences ~~any dropped loads~~.	See comments on §4.172. Indeed: 1) this recommendation concerns design and then prevention (and not mitigation); 2) It's redundant with §4.181; 3) We propose to delete §4.185. If not, the modification proposed should be moved after §4.181 (as these are prevention means for design)		X Accepted but in para. 4.185.		4.185 is more general than 4.181.	
USA	9	4	186	Revise first sentence to read: "Electromagnetic Interference (EMI) is a term to describe a number of potential disturbance mechanisms with the potential to affect electrical or electronic devices caused either by electromagnetic **conduction** or by electromagnetic radiation."	Use of word "conduction" in lieu of the word "induction" is consistent with the EMI transmission mechanisms addressed in documents such as IEC 61000-4.	X				
USA	10	4	186	Add the following sentence to the end of the paragraph: "In addition to EMI and RFI, other environmental conditions that can affect the electromagnetic compatibility performance of important to safety electrical equipment include power surges and electrostatic discharge."	Revision clarifies that there are other sources that may affect the electromagnetic compatibility performance of electrical equipment.			X	Please refer to SSG-34.This is addressed in SSG-34 that is referenced in this safety guide.	
USA	11	4	186	Add the following new paragraph after 4.186: "Digital technology is constantly evolving, and manufacturers of digital systems are incorporating performance advancements (e.g., increasingly higher processor's speed) into their designs. However, these performance advancements may have an adverse impact on the operation of digital systems with respect to EMI because of the increased likelihood of extraneous noise being misinterpreted as legitimate logic signals."	The new paragraph provides an explanation of why EMI may be a concern for digital I&C equipment.			X	Please consider that this is addressed in SSG-39 that is referenced in this safety guide.	
USA	12	4	186	Add the following new paragraph after 4.186: "With recent advances in analog electronics, many of the functions presently being performed by several analog circuit boards could be combined into a single analog circuit board operating at reduced voltage levels, thereby making analog circuitry more susceptible to EMI. Hence, operational and functional issues related to important to safety equipment in the nuclear power plant environment must address the possibility of upsets and malfunctions in I&C components or systems caused by EMI."	The new paragraph provides an explanation of why EMI may be a concern for digital I&C equipment.			X	See resolution of previous comment.	
France - IRSN	87	4	187	EMI hazards can be categorized as internal hazards (for example, caused by induction or radiation from installed equipment, either in normal operation or in fault), or as external hazards (for example, lightning, radiation from solar flares, or from equipment outside the site boundary and operated by other bodies).	EMI is an indirect effect of lightning.	X				
UK	73 (Framatone)	4	187	EMI hazards can be categorized as internal hazards (for example, caused by induction or radiation from installed equipment, either in normal operation or in fault), or as external hazards (for example, lightning, radiation from solar flares, or from equipment outside the site boundary and operated by other bodies).	EMI is an indirect effect of lightning.	X				
WNA	77	4	187	EMI hazards can be categorized as internal hazards (for example, caused by induction or radiation from installed equipment, either in normal operation or in fault), or as external hazards (for example, lightning, radiation from solar flares, or from equipment outside the site boundary and operated by other bodies).	EMI is an indirect effect of lightning.	X				

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
WNA	78	4	187	~~There are also potential security related aspects (deliberate introduction of high energy sources of radiation or electromagnetic induction).~~	Item which should be treated in others IAEA guides, and for all the internal hazards too.	X				
China	64	4	189	FROM: "The significant sources of electromagnetic interface within the control of the operating organization include fault current clearance from the operation of switchgears, circuit breakers or fuses; there could also be electric fields caused by radio transmitters" TO: "The significant sources of electromagnetic interface within the control of the operating organization include motor/generator brush assemblies, fault current clearance from the operation of switchgears, circuit breakers or fuses; there could also be electric fields caused by radio transmitters."	The motors or generators is a common source of EMI hazard. So it is suggested to supplement it into this sentence. Furthermore, the note 12 given below has no distinct relationship with this sentence, it is suggested to delete it or move it into chapter 4.187.	X			with adding lightning to the parenthesis in 4.187 and removing the footnote.	
Germany	49	4	189	The potential sources of EMI should be identified and possible effects from them should be assessed.	We suggest to add this part in the sentence, as the current chapter deals with characterization of EMI hazards as well. Not only an identification of potential sources of EMI is important but also an identification of the possible effects		X		Added to para. 4.190.	
Germany	50	4	189	(…) Significant sources of electromagnetic interference within the control of the operating organisation[12] include fault current clearance from the operation of switchgears, circuit breakers or fuses; there could also be electric fields caused by radio transmitters[12]. 12 Natural sources such as lightning strike or solar storms; and other human induced sources external to the plant are considered as external hazards	We suggest, in order to make the statement clear, to change the position of the footnote			X	Please refer to the resolution of France comment No.87. Moreover, the footnote is not anymore needed given the content of para. 4.187.	
USA	13	4	189	Add the following sentence to the end of the paragraph: "The nuclear power plants should update the identification and characterization of the potential sources of EMI as equipment upgrades/modifications are performed (e.g. new I&C equipment is installed after initial construction), which could change the electromagnetic environment."	The new sentence provides additional guidance concerning the need to update the electromagnetic profile for a given NPP.			X	See resolution of comment No. 11	
Germany	51	4	190	Other potential sources include some maintenance or construction activities, for examples portable arc welding equipment, portable radio communications or telephony brought into the nuclear plant, and ground penetrating radar used for ground surveys. These potential sources of EMI should also be identified and possible effects from these sources should be considered.	It is not enough that other potential sources of EMI are mentioned in the text. They should also be identified and their effects should be considered.	X				
ENISS	58	4	191	4.191. Identification of potential EMI hazards should account for potential sources during maintenance or faults, for example electrical faults from cables with insulation degradation or from transformer bushing insulator breakdown faults.	Transformer insulator breakdown faults is not clear enough	X				
China	65	4	193	FROM: " An assessment should be made to determine whether any source of electromagnetic interference either on-site or off-site could cause malfunction in, or damage to, the nuclear power plant's systems and components, particularly instrumentation." TO: " An assessment should be made to determine whether any source of electromagnetic interference on-site could cause malfunction in, or damage to, the nuclear power plant's systems and components, particularly instrumentation."	In section 4.187, it is said that "This document only addresses the internal hazards aspect of EMI." Please confirm the definition of "off-site". Does it mean external source or not? If it does, we suggest changing "either on-site or off-site" 10 "on-site" to avoid misleading.	X				
Germany	52	4	193	The nuclear power plant design should include preventative and/or protective measures against the effects of electromagnetic interference. An assessment should be made to determine whether any source of electromagnetic interference either on-site or off-site could cause malfunction in, or damage to, the nuclear power plant's systems and components~~, particularly instrumentation~~.	No need to emphasize instrumentation. All impacts should be considered.			X	This is a recommendation and as such should be illustrative enough.	
Germany	53	4	193	During the plant operating lifetime, both the presence of new sources and changes in existing sources of electromagnetic interference shall be monitored and analysed.	Please add in order to take new sources and changes in existing sources into account		X During the plant operating lifetime, both the presence of new sources and changes in existing sources of electromagnetic interference should be monitored and analysed.		A recommendation does not use 'shall'	
Germany	54	4	194	Electromagnetic interference should be limited such that the required function of equipment is ensured. Guidance is available for minimizing the effects of EMI on instrumentation and control (I&C) components or systems [8]. This includes a number of techniques such as:…..	Addition that EMI should be limited; is missing in the original text.	X				
China	66	4	195	FROM: " ...the equipment under test needs to be in a state that if it were to operate incorrectly this does not result in a threat to safety." TO: " ... the equipment under test needs to be in a state that if it were to operate in EMI environment this does not result in a threat to safety."	How to define the word "incorrectly"? The words "Work incorrectly" seems like "work with fault". But we think the real meaning seems to be "work in electromagnetic interference environment". So we suggest changing the word "incorrectly" in to "in EMI environment". Or you may have a better expression for it.		X If testing is to be carried out to demonstrate the efficacy of the protection against EMI provided by the design, the equipment under test needs to be in a state that if it were to operate incorrectly this does not result in a threat to safety. Besides, the tests should be performed at the typical values of parameters (e.g. input signal, output signal, ambient conditions, auxiliary power supply, electrical characteristics).		Integrated resolution taking into account other similar comments.	
Germany	55	4	195	If testing is to be carried out to demonstrate the efficacy of the protection against EMI provided by the design, the equipment under test needs to be in a state that if it were to operate incorrectly this does not result in a threat to safety. Besides, the tests should be performed at the typical values of ~~the test~~ parameters (e.g. input signal, output signal, ambient conditions, auxiliary power supply, electrical characteristics, etc.).	Addition to give advice about the test parameters		X If testing is to be carried out to demonstrate the efficacy of the protection against EMI provided by the design, the equipment under test needs to be in a state that if it were to operate incorrectly this does not result in a threat to safety. Besides, the tests should be performed at the typical values of ~~the test~~ parameters (e.g. input signal, output signal, ambient conditions, auxiliary power supply, electrical characteristics.).		Better formulation in the parenthesis.	
USA	14	4	195	Add the following at the end of the paragraph: "Testing should assess: (1) the effects resulting from both radiated and conducted EMI at different operating frequencies; and (2) the EMI emissions resulting from the equipment under test as well as the potential susceptibility of the equipment when subjected to an electromagnetic environment. Acceptable EMI performance should be defined in the test plan by the end user or testing organization according to the applicable equipment, subsystem, or system specifications."	The sentence clarifies the scope of the EMI testing.				See resolution of USA comment No. 11	
USA	15	4	195	Add the following sentence at the end of the paragraph: "The equipment should be tested in the same physical configuration as that specified for its actual installation in the nuclear power plant. In addition, the equipment should be in its normal mode of operation (i.e., performing its intended function) during the testing."	The sentence provides additional considerations related to EMI equipment testing.			X	The comment states testing best practices that are already implied and do not need to be explicitly called for.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
USA	16	4	195	Add the following as a new paragraph after the existing paragraph 4.195: "Following testing, the physical configuration of the important to safety I&C component or system should be maintained and all changes in the configuration controlled. The design specifications that should be maintained and controlled include wire and cable separations, shielding techniques, grounding techniques, EMI filters, circuit board layouts, and other design parameters that may impact the EMI qualification testing results."	The new paragraph provides additional considerations related to the prevention of EMI hazards.				See resolution of USA comment No. 11	
Germany	56	4	196	Portable sources close to sensitive equipment should be controlled in such a way, that equipment and systems important to safety will not be impermissibly influenced by these sources. …..	Addition to make clear for which cause portable sources should be controlled	X				
Poland	19	4	196	Portable sources close to sensitive equipment should be controlled. Levels of acceptance should be identified.	For clarity, what should exactly be done.			X	The measures to be implemented are described in the second sentence of para. 4.196.	3 (general comment) = FR3
USA	17	4	196	Add the following as a new paragraph after the existing paragraph 4.196: "An exclusion zone is defined as the minimum distance permitted between the point of installation and where portable EMI emitters are allowed to be activated. The size of the exclusion zones should be site-specific and depend on the effective radiated power and antenna gain of the portable EMI emitters used within a particular nuclear power plant. The size of exclusion zones should also depend on the allowable electric field emission levels designated for the area in the vicinity of the installed important to safety I&C component or system."	The new paragraph provides additional clarification concerning the "exclusion zone" term used in the document.		X An exclusion zone is defined as the minimum distance permitted between the point of installation and where portable EMI emitters are allowed to be activated.		Footnote providing the definition of the exclusion zone.	
China	36	4	200	Please clarify the damage mechanism of hazardous substances to equipment inside the plant.	This is new in this guidance, and further information is needed to execute in later design.			X	Please refer to para. 4.206.	
ENISS	59	4	200	4.200. Hazardous substances ~~Toxic and corrosive materials and gases~~ have the potential to disable plant items or systems or to affect personnel carrying out actions important to safety. The potential to release stored hazardous substances or to generate them within the site boundaries is considered as an internal hazard within this safety guide. The effects of dangerous chemical substances that should be considered in the safety analysis should include: the effect due to the physico-chemical properties (explosive, oxidising, flammable), or due to the toxicological properties (toxic, irritant, corrosive, anoxic, ...).	- "*Toxic and corrosive materials and gases …*" the list is too specific for the first sentence; it is better to be more general here. The nature of the hazardous substances should be defined later in the document. - the physical effects to consider, in relation with the hazardous substances present on site, should be mentioned.	X	X With modification: The effects of hazardous chemical substances that should be considered in the safety analysis should include: the effects due to the physico-chemical properties (e.g. explosive, oxidizing, flammable) and the toxicological properties (e.g. toxic, irritant, corrosive, anoxic).			2 (same as FR3)
ENISS	60	4	201	4.201. Release of hazardous material affecting the plant originating from outside the site or the control of the operating organization is considered as an external hazard. However some of the considerations in this safety guide could also be relevant. ~~Examples of these external hazards would include gas clouds from facilities operated by other companies neighbouring the site, or for example, chlorine release from a road tanker accident on neighbouring roads.~~	The last sentence "*examples of these … roads*" should be suppressed. The given examples are not necessary and also they do not describe all the potential effects due to accidents that could occur outside the site.		X With modification: 4.201. Release of hazardous material affecting the plant originating from outside the site or the control of the operating organization should be considered as an external hazard (e.g. chlorine release from road tanker accident). However, some of the considerations in this safety guide could also be relevant.		More concise formulation.	
ENISS	61	4	202	4.202. Identification of the materials holdings (i.e. quantity, physical and chemical form, type, storage arrangements) within the site boundary should be performed to determine what materials, if released, could ~~either affect components of systems important to safety or~~ cause adverse effects on personnel that might affect their ability to carry out actions important to safety. The identification needs to account for material storage locations. ~~The identification needs to account for material storage locations, and the routes followed by distribution means and delivery vehicles, as the location of potential releases will be important to an understanding of the subsequent hazard.~~	The effect (mostly corrosive) onto components induced by chemical substances is considered to be a slow process. Therefore, it should not induce faults of components in the short term and should be only considered in the post-accident phase. Regarding the hazardous substances transportation inside the site, the risk is mainly due to accidents occurring during specific discharge operations on the devoted transfer areas. This is the approach considered in the classic industries		X 4.202. Identification of the materials holdings (i.e. quantity, physical and chemical form, type, storage arrangements) within the site boundary should be performed to determine what materials, if released, could either affect items important to safety or cause adverse effects on personnel that might affect their ability to carry out actions important to safety.	X	One example of short term effects: desiccant particles clogging air operated valve actuators. The last sentence should stay because potential locations of hazards is important to understand potential consequences.	10 (2.12 (e))
ENISS	62	4	203	4.203. The list of the hazardous substances that could be potentially released should be established by a hazard identification process. The list of the substances to consider is the result of the physical effects to consider regarding the safety objectives. ~~These potential releases could come from a variety of differing sources, for example: (a) Bulk stored gases, which might be part of the normal water chemistry or used for specific plant protection purposes. Examples of these could be nitrogen, hydrogen, chlorine, carbon dioxide, depending on the nuclear plant design, and should be confirmed by hazard identification processes. (b) Bottled gases, if stored in sufficient quantities such that a release could cause a hazard to plant or to personnel carrying out actions important to safety. These could include releases such as hydrogen or propane, which can be covered under internal fire or internal explosion. (c) Releases of volatile liquids that could generate a vapour cloud, either under ambient conditions or if they have the potential to come into contact with plant items with elevated temperatures. (d) Examples could include chemicals used in water chemistry such as hydrazine, glycol, dimethyl amine, and should be confirmed by hazard identification processes. (e) Releases of chemicals that could accidentally mix and form a secondary product as a cloud~~	The given examples could cause confusion : - cases treated in other parts of the safety demonstration (internal explosion with the case of hydrogen circuits, nitrogen bottles); - chlorine could have a toxic effect; - carbon dioxide could have anoxic effect. examples should be suppressed (c) the mechanism of physical effect is not clear.		X With modification: The list of the hazardous substances that could be potentially released should be established by a hazard identification process. The list of the substances to consider is the result of the physical effects to consider regarding the safety objectives. These potential releases could come from a variety of differing sources, for example: bulk stored gases, bottled gases, releases of volatile liquids, chemicals used in water chemistry, and releases of chemicals that could accidentally mix and form a secondary product as a cloud.		More concise formulation taking into account that the identification has been addressed in para. 4.202.	
Poland	20	4	203	"These potential releases could come from a variety of differing sources, for example: (a) Bulk stored gases… Examples of these could be nitrogen, hydrogen… (b) Bottled gases… These could include releases such as hydrogen or propane… (c) Releases of volatile liquids that could generate a vapour cloud… Examples could include chemicals used in water chemistry such as hydrazine, glycol… ~~(d) Examples could include chemicals used in water chemistry such as hydrazine, glycol…~~ ~~(e)~~(d) Releases of chemicals that could accidentally mix and form a secondary product as a cloud."	Item (d) does not form a separate list of hazardous releases. This is just examples of item (c) hazards. Item (d) must be merged with item (c).		X		Integrated resolution taking intoaccount other MS comment	
USA	18	4	203	Combine subparagraphs (c) and (d) or added to subparagraph (d) text that states the referenced chemicals used in water chemistry are examples of.	Clarifies the criteria.			X	The comment is not anymore applicable. Please refer to the new consolidated para. 4.203.	
ENISS	63	4	205	4.205. Potential hazard effects on plant personnel required to fulfil safety functions should be considered. These could include toxic and asphyxiation effects with the potential to disable or otherwise impair the plant personnel. Care should be taken to ensure that the release of hazardous substances would not prevent actions by plant personnel to control the incident or to safely shutdown the plant and maintain it in a safe shutdown state. Moreover, if personnel have to be in areas that could be impacted by a release of hazardous or noxious substances to accomplish a safety function required to bring and maintain the plant in a safety shutdown state, they should be adequately protected.	A common approach is to demonstrate that a release of hazardous chemicals or noxious substances, that have toxicological effects, does not affect the ability of operators in the Main Control Room to adequately perform the required safety functions.			X	Better wording consistent with para. 4.202.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
France - IRSN	88	4	206	Examples could include deposition causing shorting at electrical contacts for I&C equipment, and ingestion of non-combustive gases by diesel generators that might cause them to fail to run; also some other plant systems could be affected by the cooling effects of gas clouds. Prompt or short-term potential corrosion effects should be also identified.	Lack of combustive air will induce the failure.		X Examples could include deposition causing shorting at electrical contacts for I&C equipment, and ingestion of non-combustible gases by diesel generators that might cause them to fail to run; also some other plant systems could be affected by the cooling effects of gas clouds. Prompt or short-term potential corrosion effects should be also identified.		Better wording. Non-combustive?	
WNA	79	4	206	Examples could include deposition causing shorting at electrical contacts for I&C equipment, and ingestion of non-combustive gases by diesel generators that might cause them to fail to run; also some other plant systems could be affected by the cooling effects of gas clouds. Prompt or short-term potential corrosion effects should be also identified.	Lack of combustive air will induce the failure.		X Examples could include deposition causing shorting at electrical contacts for I&C equipment, and ingestion of non-combustible gases by diesel generators that might cause them to fail to run; also, some other plant systems could be affected by the cooling effects of gas clouds. Prompt or short-term potential corrosion effects should be also identified.		Better wording	
Poland	21	4	207	"Prevention of releases of hazardous substances in the first instance include the general considerations of the first level of defence in depth with respect to minimizing the likelihood of a release, including conservative design and material choices, high quality in construction, and surveillance both in construction and operation…"	Material choices is very important for prevention of releases of hazardous substances, but just pure mention of this without any suggestion, proposal, recommendation and real life examples is not adequate for document that supposed to be a Safety Guide. It should be noted and clarified in the document, that if there are a possibility to replace any toxic material, or materials which can be a source of toxic, poison gases in some circumstances, i.e. during fire, construction collapse, etc., with other non-toxic materials – it should be done. The use of PVC, asbestos, should be limited or forbidden. The use of mercury containing daylight lamps should be justified for each area, building or compartment, etc., and lamps protection from accidental broke should be used. Proper clarification, explanation and examples should be provided in the guide regarding proper material choices.			X	This guide is supposed to be technology and design neutral. Therefore, giving examples that might not be relevant is counterproductive. Of course, when we say material choices, this means in the context of this chapter, material that do not lead to the release of hazardous substances.	5 = FR5
ENISS	64	4	209	4.209. As with other internal hazards, adoption of good design principles such as ~~redundancy and diversity,~~ minimization of quantities, storage far from safety classified buildings, separation and segregation can have a significant effect on the occurrence and the development of hazards from releases of hazardous substances. In some cases, scenarios of concern can be largely eliminated by taking care over the location of systems relative to the storage arrangements for hazardous material.	Redundancy and diversity should be suppressed; this concept applies to systems important to safety related to prevent from fuel melting prevention. Principles such as minimization of quantities, storage locations, not inside safety classified buildings should be put in evidence in the text.			X	Redundancy and diversity are good principles to address internal hazards (see sections 2 and 3). The addition (minimization of quantities,… buildings) is too specific to be mixed with high level principles.	1 = UK1
ENISS	65	4	210	4.210. When necessary, ~~E~~engineering protection provisions preventing the hazard consequences from releases of hazardous substances should include controls for ventilation systems for plant areas or control rooms where actions to fulfil safety functions are needed. Control systems should close ventilation intakes putting the area into a recirculation mode and therefore preventing ~~immediate~~ incapacitating effects on the plant personnel required to be present to fulfil safety functions, (especially regarding the protection of the personnel in the Main Control Room). Relevant guidance for the design of the ventilation systems are provided in [12].	See comments on §4.205.		X 4.210. When necessary, ~~E~~engineering protection provisions preventing the hazard consequences from releases of hazardous substances should include controls for ventilation systems for plant areas or control rooms where actions to fulfil safety functions are needed. Control systems should close ventilation intakes putting the area into a recirculation mode and therefore preventing ~~immediate~~ incapacitating effects on the plant personnel required to be present to perform actions important to safety. Relevant guidance for the design of the ventilation systems is provided in [12].		Better wording, consistent with 4.202.	4 (same as FR5 and UK1)
France - IRSN	89	4	210	… Control systems should close ventilation intakes, putting the area into a recirculation mode and therefore preventing immediate effects on the plant personnel.	A comma is missing	X				
ENISS	66	4	212	4.212. The design principles of ~~redundancy and diversity,~~ minimization of quantities, separation and segregation, should be used to assist in the mitigation of hazards from releases of hazardous substances. Systems that include redundant capability with good segregation or separation should have sufficient redundant subsystems unaffected by the release that their safety functions will be successfully fulfilled even with failures in some of the system components	See comments on §4.209			X	See resolution of comment No. 64..	12 (3.2 (c))
Poland	22	4	212	"The design principles of redundancy and diversity, separation and segregation of important to safety SSC's should be used to ~~assist in~~ ensure the reliable functionality of SSC's and to achieve the mitigation of hazards from releases of hazardous substances…"	It is unclear redundancy, diversity, separation and segregation of what should be used – SSC's important to safety, other items or equipment? Or hazardous and toxic materials storages, barrels and casks? As it is originally written, it might appear, that guide recommends do not keep hazardous or toxic materials in one place, but spread them (in lower quantities) all across the NPP site and area. Proper clarification of what is required to be diversified and separated should be provided in the guide.		X The design principles of redundancy and diversity, separation and segregation of SSCs important to safety should be used to ensure their reliable functionality, and to achieve the mitigation of hazards from releases of hazardous substances.		Better wording	13, same as FR12 (3.2 (c))
France - IRSN	90	4	213	~~For some plants, the effects of locating plant within buildings could mean that gas clouds have blown past or reduced in density before significant ingress into the building that might affect the local environment for equipment such as cables and cubicles.~~	Proposition to delete this paragraph: the current state of the art does not allow a conservative assessment of this point.			X	No link between the comment and the paragraph.	
USA	19	4	213	Revise the paragraph to clarify paragraph intent. Clarification may be needed to address locating plant systems within buildings? Unable to provide proposed revised language as the intent is unclear.	Clarifies the criteria.			X	The comment is unclear and there is no suggestion for new text.	
France - IRSN	91	4	215	These might have an effect on longer term component or system integrity, but it should be demonstrated ~~is assumed~~ that these would be managed by processes intended to maintain the condition of plant.				X	The intent of this paragraph is to provide the scope of the section related to hazardous substance releases.	
Armenia	1	4		To add a new paragraph on separation of control and power cables	The proposed paragraph should address issue of separation of control and power cables. In case that the separation is not possible, the appropriate protection by means of qualified fire rated barriers or encapsulations should be used.			X	Normally covered by 4.15	
China	13	I	2	This Safety Guide does not describe the impacts from Vehicular Transport, please clarify whether the Impacts from Vehicular Transport is considered as an internal hazard?	The Impacts from Vehicular Transport is described in NS-TAST-GD-014 as an internal hazard.			X	The scope of the guide is according the DPP that was approved by the Review Committees and endorsed by the CSS. Please refer to para. 3.5. Also 'other internal site specific hazards may exist and could be covered by this general guidance' was added in 1.5.	
Japan	16	Fig II	1	"YES" arrow should lead to the box of fire compartment approach, while "NO" arrow to fire cell approach.	Unclear directions of arrows. Two arrows from 4th box reach the same box described with a dashed line.	X				
China	55	FIG II	I	Suggest to adjust: FROM: "the arrow of yes or no pointing to the dot line with scope of the fire hazard analysis." TO: "the arrow of yes or no pointing to the different approach of fire compartment or fire cell directly."	It is more reasonable.	X				
China	57	FIG II	I	Suggest to add "yes or no" for the step of "further divide into fire cells if necessary"	There should be two ways for necessary or not necessary.	X				
China	56	FIG II	I	Suggest to adjust: The boxes of "Fire compartment approach (fire area)" and "Fire cell approach" outside of the "Scope of the fire hazard analysis".	Because fire zoning approach which divided each building into fire compartment and fire cell is not in the scope of fire hazard analysis.			X	Consistency with NS-G-1.7	
China	54	FIG II	1	FROM: "Demonstrate that the safety objectives are met: Para II.4(1)" TO: "Demonstrate that the objectives are met: Para II.4(f)"	In Para II.4, there are the purposes of fire hazard analysis, but not all of them are linked with safety.			X	Please refer carefully to para. II.4; all the purposes are related to safety as they are linked to items important to safety.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
UK	92 (BAE)	Fire cell approach (TH)	Fire cell approach (TH)		Another approach is robust containment at the equipment level, i.e. robust housings with limited ventilation and high heat capacity. This contains fire at its source. A previous comment suggest an introduction to the fire influence approach – this comment is to be considered and included there			X		
UK	91 (BAE)	Fire compartment approach – general note (TH)	Fire compartment approach – general note (TH)		A previous comment suggest an introduction to the fire confinement approach – this comment is to be considered and included there			X	Both fire confinement and fire cell approach are introduced in this darft safety guide.	
Mexico	23	footnote	footnote	Possible examples include but are not limited to fuel tanks, chemical tanks, and fire extinguishing materials.	Missing the period in the paragraph.	X				
Mexico	2	Footnote 1	Footnote 1	Therefore, it is not necessary or even feasible to prescribe a set of combined hazards that would not be applicable to all sites.	The original text is contradictory with the idea of the footnote. This is mentioning that is not necessary to perform an analysis of hazards that apply to all sites, instead of recommend that is not necessary to perform an analysis for those hazards that don't apply to all sites into the plant			X	Please refer to the whole footnote to understand its second sentence. The footnote explains that since the combination can involve external hazards that depend on the site characteristics, it is not possible to set-up combinations of hazards that would be applicable to all sites. There is no contradiction.	
Japan	1	General	General	Clarification or definition for the difference between “separation” and “segregation” is necessary. The way of usage of two words seems to have different meanings respectively.		X			See related footnotes.	
USA	1	General	General	Add a statement early in the document that the considerations of “fire compartments” or “fire cells” should be consistent with Figure II.1, “Application of the fire compartment approach and the fire cell approach”	The use of these phrases is not clear that it is referring to Figure II.1. Since the phrases are used often in may paragraphs throughout the guide defining the use of the phases early in the guide will enhance the intent of their use.	X				
UK	93 (BAE)	General (TH DP)	General (TH DP)		Abbreviations / Acronyms need to be defined both in the document the first time they are used and on a sheet close to the front of the document.	X				
UK	94 (BAE)	General (TH)	General (TH)		Consider replacing 'core melting' with 'fuel damage' throughout the document. Core melting is a more specific subset of fuel damage. Common IAEA terminology needs to be adopted.			X	Core melting is closer to the IAEA terminology (see e.g. SSR-2/1 (Rev.1))	
ENISS	1	General comment	General comment	See below detailed proposed modifications	Throughout the document, §2.12 is referred to as the objectives on which the success criteria of the approach are based. The current version of §2.12 is mentioning ‘real’ objectives (a & e) but also proposed means to fulfill them (c) and other good practice principles (b & d). The proposed changes are aimed at clarifying §2.12 and focusing it on the core safety objectives of the safety case.					
ENISS	2	General comment	General comment	Expressions in the main text should be defined, or refer to the definition given in Appendixes	Example for “fire compartment”, used in §3.19 and extensively in §4, without reference to the definition in Appendix II - II.15	X				
Poland	9	General Comment	General Comment	“Prevention of explosion hazards”	1. No clear recommendations are provided regarding measures to prevent of hydrogen buildup in the containment. No information are provided regarding the usage of hydrogen recombiners, hydrogen combustors or inert gases in the reactor containment. The 4.73 paragraph only briefly mentions few protective measures against hydrogen explosion in general context. Protective measures to prevent hydrogen explosions in the reactor containment as well as other compartments should be clarified. Clear recommendations regarding mitigation of possible hydrogen explosion consequences (like forcible containment ventilation) in nuclear power plant should be provided. 2. NPP in the shutdown mode, under maintenance, or under decommissioning requires source of steam for technological processes, for example, to ensure functioning of liquid radioactive waste reprocessing facility. To produce such steam, steam generating facility are necessary within NPP site, which will require gas or oil as a heat generating source. Proper recommendations should be provided regarding layout and place of steam generating facility compared to other NPP buildings and SSC's important to safety. Proper recommendations should be provided regarding gas supply pipelines and other gas infrastructure layout within NPP site. Proper recommendations should be provided regarding fire and explosion safety measures within steam generating facility and around related gas supply infrastructure.			X	There is a specific safety guide dealing with hydrogen risk in the containment: DS482 Please refer to para. 4.60 to 4.63.	
Poland	25	General Comment	General Comment	“Access and Escape Routes”	Due to nuclear security requirements, NPP and other nuclear facilities has a lot of passageways in different buildings or compartments, like main control room, reactor hall, fuel storage, corridors connecting two units, etc. protected by physical security measures, such as doors with electronic lock, turnstiles. It should be added requirement in the guide, that there must be either alternative routes to escape from compartments, halls, rooms without passing electronic physical security control points, which might not work in the hazardous event, or such electronic physical security check points should be automatically unblocked in case of fire, smoke, release of toxic gases, or in any other hazardous event.			X	We are not supposed to address security issues in this safety guide. The design of the protections against internal hazards should be conducted taking into account design recommendations for safety and security in an integrated manner (please refer to para 3.3).	
UK	90 (BAE)	General fire-fighting comment	General fire-fighting comment. (DP)	Where there is a risk of fire-fighting water reaching materials which could cause a criticality, alternative means of fire-fighting should be investigated, or suitable precautions should be taken.	Water should not be allowed to come into contact with radioactive materials which could cause an uncontrolled criticality. This is mentioned in Appendix 2.97, but is only cited for portable and mobile extinguishers, not hose reels, etc Additional text on criticality should be considered at the next IAEA sentencing meeting - location to insert this comment to be discussed)			X	The comment is covered in a general way by para. 4.19.	
UK	89 (BAE)	General fire-fighting comment (DP)	General fire-fighting comment (DP)	Consideration should be given to access by fire-fighters entering the building using the same route as staff evacuating the building simultaneously.	This occurred during the Grenfell Tower fire in London, and hampered the efforts of the fire-fighters entering the building (incorporation of this comment to be discussed)			X	Since the routes are marked, normally such a situation should not happen.	
Finland	1	General, Flooding section	General, Flooding section	An observation to be considered at next round: IAEA could consider reorganizing the chapter concerning flooding. The following order of the issues related to flooding would further enhance the draft safety guide: - physical separation of the safety system redundant divisions in safety system building/divisions; - prevention of propagation of flooding; - space where separation of safety systems is not possible; - protection needs; - failure criteria (the conditions when one division may be lost, when protection is needed for flooding inside the division)	Further enhancement of the chapter concerning flooding.			X	Please note that we tried to have the same structure for all internal hazards. Adopting this specific structure for flooding would break this structure harmonization.	
USA	30	I	2	Recommend combining these two paragraphs.	They are two parts of the same topic (why a performance-based approach is recommended).			X	The combination of paragraphs I.2 and I.3 leads to a long paragraph, and does not improve the clarity.	
China	37	I	3	The footnote description is not specific, please clarify what is the specific performance-based approach .				X	The comment is not clear. The intent of the footnote is only to describe what a performance-based approach means.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Germany	58	I	3	Instead, a performance-based approach is recommended. This approach, regardless of the specific methods or criteria being used, should be comprehensive and systematic. The objective is to identify which hazard combinations need to be considered and what design features are necessary to address them. The basis for screening a hazard combination ~~from~~ for further consideration should be clearly defined and documented as well as for screening out combinations of hazards.	See also comment 11 . The documentation of screened out combinations of hazards makes sure no combination has been missed.		X The basis for screening a hazard combination for further consideration, as well as for screening out combinations of hazards should be clearly defined and documented.		More clear formulation	
China	53	I	4	"Unrelated (independent) events: An initial event, e.g. an external or internal hazard, occurs independently from (but simultaneously with) an internal hazard without any common cause. Examples are external flooding and independent internal explosion, seismic event and independent internal fire."	Please explain what kind of elements are taken into consideration when selecting the combinations as examples. Otherwise the examples are not appropriate to be listed here as they are not always applicable.			X	See resolution of USA comment No. 31	
Spain	3	I	4	(3) Unrelated (independent) events: An initial event, e.g. an external or internal hazard, occurs independently from (but simultaneously with) an internal hazard without any common cause. Examples are external flooding and independent internal explosion, seismic event and independent internal fire. Some combinations of these independent events may be excluded due to the low probability of simultaneous occurrence, so the possibility of screening such coincidence based on this criterion will be acceptable.	The Appendix I deals with the combination of hazards and considers that, a priori, the possibility of unrelated (independent) events occurring simultaneously should be considered, among other combinations, for example, an external flood plus with an internal explosion or an earthquake plus an internal fire. The current deterministic analyses do not consider simultaneity of independent events according to the existing regulations due to the low probability of simultaneous occurrence. The possibility of screening such coincidence should be indicated based on this criterion.			X	Please refer to I.6. The low probability of simultaneous occurrence of two independent events is implicitly taken into account.	
China	38	I	5	Please clarify what the mission time is?			X		if the comment is aimed at providing numerical values, we do not provide figures as the mission time is specific to the systems and to their design. Definition of mission time can be found in different recognized documents/ standards (e.g. ASME 2009 PRA standard, IAEA safety guide SSG-3).	84, same as UK76
USA	31	I	5	Recommend using either “unrelated events” or “independent events.”	Both unrelated and independent have the same meaning.			X	‘independent’ might be interpreted in the mathematical meaning. Adding the term ‘unrelated’ helps to improve clarity since there are hazard combinations that are related yet independent using the strict mathematical definition.	
USA	32	I	5	Recommend deleting the sentence: “For unrelated independent events, an identification process should be adopted to include all foreseeable independently occurring hazards, where the second is sufficiently probable that it could occur in the mission time for the systems responding to the primary hazard.”	It is not clear why an identification process needs to be discussed for all foreseeable independently occurring hazards in “Appendix I; Hazard Combinations,” when Chapter 3 has discussed identification of hazards. If a second hazard is sufficiently probable after a primary one has occurred, then they cannot be independent events.				See resolution of the previous comment.	
China	39	I	6	Please clarify the specific screening frequency values that are screened according to the probability method. Give examples of un credible combinations.				X	Regarding the screening frequency, we try to avoid providing numerical values in this safety guide. As example of non-credible combination	
France - IRSN	92	I	11	Following screening, some hazards combination could be determined to be credible but need to be assessed against specific acceptance criteria	Not clear. Additional information or examples is needed		X Following screening, some hazards combination could be selected ….		More precise wording	
Armenia	3	I	I	To add a new paragraph on frequency estimation of combined hazards.	The Chapter does not give insights on frequency estimation of combined hazards.			X	Embedded in I.6 and out of the scope of this safety guide.	100, same as for FR107 and UK84
ENISS	67	I	I	*See comment on 3.6*	The consistency of the vocabulary for combined and consequential hazards must be ensured within the text (§2.7, §2.8, §2.9, §3.6 for instance) and the appendix.	X				
Poland	23	II	1	(c) The fire is postulated whatever the normal operating status of the plant, whether at power or during ~~shutdown~~ outage.	Taking into account PRIS definition term “outage” is more suitable. [def: (…) By this definition, the outage includes both power reduction and unit shutdown.]			X	At power means at a power spanning from nominal power to low power. Therefore, we need to keep shutdown.	
USA	33	II	1	Revise the first sentence to read: “The fire hazard analysis should be developed with the following assumptions:”	It is unclear what is meant by “developed on a deterministic basis” in this context.			X	Please refer to bullets (a), (b) and (c) to understand from the wording ‘postulated’.	
ENISS	68	II	3	II.3. Simultaneous unrelated fires occurring not in the same fire compartment, in particular, if occurring at multi-unit, multi-source sites, should not have to be considered in the design of fire protection means; however the possibility of a fire spreading, even from one unit to another unit or source, should be prevented or taken into account in the fire hazard analysis.	Prevention is most of the time the better way in that case.			X	One of the objectives of the fire hazard analysis is to define means of fire prevention.	
USA	34	II	3	Revise the sentence to read: “Simultaneous unrelated fires should not be considered in fire hazard analyses, even at multi-unit sites.”	The existing text has confusing wording, and it is unclear what is meant by “multi-source” sites.			X	For multiple unit and multiple source site, please refer to paragraphs 3.32 to 3.35.	
Armenia	4	II	4	(b) To identify the relevant items important to safety and to establish the locations of individual components and their power supply source in fire compartments (e.g. control and power cabled, electrical cabinets).	The component power supply routing can play significant role in case of fire. The component inoperability can be caused by failure of control and/or power supply cables or cabinet)			X	The power supply source is important to safety, thus included in the items important to safety.	
ENISS	69	II	4	II.4. The fire hazard analysis has the following purposes: (a) To identify the type and amount, as well as the location and distribution, of fire loads and their potential ignition sources over the room or plant area. … (f) To identify cases … or from inadmissible fire consequences.	Clarification			X	All potential ignition sources have to be identified.	
France - IRSN	93	II	4	To identify the type and amount, as well as the location and distribution, of fire loads and potential ignition sources over the room or plant area. This identification should include transient fire loads and ignition sources.	Question: Why do we need to identify ignition sources when fire is postulated (cf. II.1.a)?		X To identify the type and amount, as well as the location and distribution, of fire loads (fixed and transient) and potential ignition sources over the room or plant area.		More precise wording	22, same as FR22 and UK15
France - IRSN	94	II	4	To identify the relevant items important to safety and to establish the locations of individual components (including control/power cables) in fire compartments.			X To identify the relevant items important to safety and to establish the locations of individual components (e.g. control or power cables) in fire compartments.		More precise wording.	
Russia - Rostechnadzor	5	II	4	the passive and active protection means necessary to separate ~~either redundant~~ items important to safety required after a fire ~~from each other or~~ from inadmissible fire consequences	Additional measures of protection of the items important to safety which work is required after the fire are mentioned in the first sentence of this paragraph. The same items should be mentioned in the second sentence as well.			X	The proposed text does not reflect the idea of the second sentence of bullet f). Indeed, the second sentence is related to the areas where it is not possible to have fire compartments.	
France - IRSN	95	II	5	The secondary effects of fires and of fire suppression should be evaluated in the frame of the fire hazard analysis in order to ensure that these secondary effects would not have any adverse effect on nuclear safety.	“secondary effects” must be defined (cf. 4.30)		X		See resolution of ENISS similar comment. See also definitions	
USA	35	II	5	Delete the following text: “…in the frame of fire hazard analysis.”	This text does not have a clear meaning.	X				
UK	75 (BAE)	II	9		Resistance and integrity are two different properties. The first is about thermal conductance; the second is about maintaining containment. ONR considers that the wording of the complete paragraph could be improved.			X	Please refer to para. III.2 of NSG-1.7.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
UK	77 (BAE)	II	9	Add "at any one point) **over a defined period."**	The fire rating of a barrier only has meaning over a defined period of time. Insert duration considerations in the edit of first bullet (see previous comment – also change mechanical resistance to integrity)		X Thermal insulation, which is considered satisfactory when the temperature of the unexposed face remains below a prescribed value (e.g. 140 °C on average, and 180 °C at any one point) over a defined period of time.		Better formulation.	
Germany	59	II	10	The absence of ~~any~~ relevant emission of flammable gases from the face unexposed to the fire should also be verified. *Change or delete completely* .	"Any" emission is very strict. Many fire barriers are not gas tight so that small amounts of flammable CO etc. get through a barrier during fire. The criteria of II.9 are practically used in material testing and are proven to satisfy. Requirement II.10 must be less strict or may be deleted completely.	X				
USA	36	II	10	Delete paragraph II.10.	It is unclear how to verify this criteria short of subjecting the barrier to an ISO 834 test with additional gas measurements. This is not practical and it is unknown if this has ever been done.		X The absence of relevant emission of flammable gases from the face unexposed to the fire should also be verified.		Integrated resolution taking into account other similar comments.	
WNA	80	II	10	~~The absence of any emission of flammable gases from the face unexposed to the fire should also be verified.~~	Reason not clear		X The absence of relevant emission of flammable gases from the face unexposed to the fire should also be verified.		Integrated resolution of other similar comments.	
Poland	24	II	12	"Within each category, the fire classification of the components is expressed as a 'rating'… in accordance with the standards of the International Organization for Standardization (ISO) or other nuclear industry codes and standards (?)."	It is unclear what *"other standards"* is considered here. Proper clarification or relevant footnote should be added in the guide with information what other standards can be applicable in this case (see also comment for paragraph 4.135).		X Within each category, the fire classification of the components is expressed as a 'rating' (in minutes or hours) corresponding to the period of time for which the components continue to perform their function or role when subjected to a thermal test programme in accordance with the standards of the International Organization for Standardization (ISO) or other relevant standards.		Nuclear industry codes and standards is quite general. It is better to say 'relevant standards'. Mentioning of national standards is avoided.	90, same as UK81
Russia - Rostechnadzor	6	II	14	Redundant ~~items important to~~ divisions of safety systems should be located in separate fire compartments, in	The recommendation to place the redundant items important to safety, in separate fire compartments is superfluous. Such recommendation, or even the requirement, has to refer to safety systems.			X	Consistency with NS-G-1.7	
Germany	60	II	15	A fire compartment is a building or part of a building that is completely surrounded by fire resistant barriers: all walls, the floor and the ceiling. The fire resistance rating of the barriers should be sufficiently high that total combustion of the fire load in the compartment can occur (i.e. total burnout) without breaching the fire barriers. Engineering methods to calculate the required fire resistance rating may consider oxygen supply and burn rate to calculate the heat release rate.	The requirement to consider "total burnout" may lead to somewhat extreme fire resistance ratings especially when large fire load densities are involved.			X	This is a definition. The addition is questionable in this context	
WNA	82	II	15	…..can occur ~~(i.e. total burnout)~~ without breaching the fire barriers.	Ventilation typically limits the combustion. This assumption is too conservative. See also 3.11.			X	Definition consistent with NS.G. 1.7	
Russia - Rostechnadzor	7	II	16	prevent the failure of redundant ~~items important to~~ divisions of safety systems.	In last line of this paragraph, it is necessary to make the same corrections as well as in the previous comment and for the same reason.				See previous Rostechnadzor comment	
France - IRSN	96	II	18	Since any penetration of a barrier can reduce its overall effectiveness and reliability, such penetrations should be minimized in particular at fire borders between redundant items important to safety…….	Special attention at borders between redundant items important to safety.		X Since any penetration of a barrier can reduce its overall effectiveness and reliability, such penetrations should be minimized in particular between different redundant divisions		More precise wording.	
Germany	61	II	18	Since any penetration of a barrier can reduce its overall effectiveness and reliability, such penetrations should be minimized in particular at fire borders between redundant items important to safety…….	Requirement relevant for barriers between redundant items important to safety.		X Since any penetration of a barrier can reduce its overall effectiveness and reliability, such penetrations should be minimized in particular between different redundant divisions		See integrated resolution considering other similar comments.	
WNA	83	II	18	Since any penetration of a barrier can reduce its overall effectiveness and reliability, such penetrations should be minimized in particular at fire borders between redundant items important to safety…….	Special attention at borders between redundant items important to safety.		X		see resolution of previous comment	
UK	76 (Framatone)	II	19	The fire confinement approach does	See comment 81		X The fire containment approach does…		Better wording	
WNA	84	II	19	The fire ~~compartment~~ containing approach does	See comment 81		X		Better wording	
France - IRSN	97	II	20	For example: (a) In areas such as the reactor containment and in control rooms of certain designs, where redundant ~~divisions~~ trains of safety systems could be located close to each other in the same fire compartment; …	See comment 4			X	To be discussed. Consistent with NS-G-1.7	
UK	78 (Framatone)	II	20	…… of the fire confinement approach throughout the …. . For example: (a) In areas such as the reactor containment and in control rooms of certain designs, where redundant divisions of safety systems could be located close to each other in the same fire compartment; …	See comment 81 See comment 4 Please note "confinement" and "divisions" to be used throughout the document		X		See comment 74.	
WNA	85	II	20	…… of the fire ~~compartment~~ containing approach throughout the …. . For example: (a) In areas such as the reactor containment and in control rooms of certain designs, where redundant ~~divisions~~ trains of safety systems could be located close to each other in the same fire compartment; …	See comment 81 See comment 4		X Of the fire containment approach		Consistency with NS-G-1.7	
UK	79 (Framatone)	II	21	….separate fire cells. This is known as the 'fire influence approach'. Figure II.1. illustrates applications of the fire confirnement approach and the fire influence approach.	See comment n°72 on § 4.70		X		See comment 74	
WNA	86	II	21	….separate fire cells. This is known as the 'fire ~~cell~~ influence approach'. Figure II.1. illustrates applications of the fire ~~compartment~~ containing approach and the fire ~~cell~~ influence approach.	See comment n°72 on § 4.70		X		Better wording consistent with NS.G. 1.7	
China	58	II	22	Suggest to add following sentences: "The fire resistant rating of fire barriers used for fire cells could be determined in the fire hazard analysis."	It is missing for the fire resistant rating of fire cells.		X with modification: After wraps) and their fire rating should be specified....system.		Better wording.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
France - IRSN	98	II	22	Fire cells are separate areas in which redundant items important to safety are located. Since fire cells might not be completely surrounded by fire barriers, spreading of fire between cells should be prevented by other protection means. These means include the following: − The limitation of combustible materials; − The separation of equipment by distance, without intervening combustible materials; − The provision of local passive qualified fire protection such as fire shields or cable wraps; ~~− The provision of fire detection and extinguishing systems. Combinations of active and passive means could be used to achieve a satisfactory level of protection; for example, the use of fire barriers (walls, ceilings, floors, doors, dampers, penetration seals and cable wraps) should be specified in the fire hazard analysis together with an extinguishing system~~	The design of the fire cell must be only based on passive protection means.			X	The active systems (e.g. extinguishing systems) are needed to avoid propagation of fire from one fire cell to another.	
Japan	15	II	22	− The provision of fire detection and automatic extinguishing systems.	For separation measure, stricter requirement is needed.			X	Some of the extinguishing systems are manual.	
Russia - Rostechnadzor	8	II	22	Fire cells are separate areas in which ~~redundant~~ items important to safety are located	In the requirement 17 SSR-2/1 (Rev. 1) it is spoken about protection against external and internal hazards of the relevant items important to safety, but not redundant items of these systems.			X	The initial text is consistent with NS-G-1.7.	
China	59	II	23	FROM: "The fire hazard analysis should demonstrate that protection measures are sufficient to prevent the failure of redundant items important to safety that are located in separate fire cells in the same fire compartment" TO: "The fire hazard analysis should demonstrate that protection measures are sufficient to prevent the failure of redundant items important to safety that are located in separate fire cells"	There exists a kind of fire cell independent from fire compartment. So not all of the fire cells are include in the fire compartment	X				
Russia - Rostechnadzor	9	II	23	prevent the failure of ~~redundant~~ items important to safety that are located in separate fire cells.	In line 2 of this paragraph, it is necessary to make the same corrections as well as in the previous comment and for the same reason.			X	Please refer to NS-G-1.7 and see new para. II.23.	94, same as FR104 and UK82
ENISS	70	II	24	II.24.Where separation by distance alone is claimed as the protection between fire cells within a fire compartment, the fire hazard analysis should demonstrate that neither ~~radioactive~~ radiative nor convective heat transfer effects would jeopardize the claimed separation.	Clarification (it refers to a radiative heat transfer, not radioactive)			X		
France - IRSN	99	II	24	Where the separation by distance alone is claimed as the protection between fire cells within a fire compartment, the fire hazard analysis should demonstrate that ~~neither radioactive nor~~ convective heat transfer effects would not jeopardize the claimed separation	As this paragraph deals with the fire cell approach, it seems clearer just to consider the heat transfer effects		X …neither radiative nor convective heat transfer….		Radiative heat transfer should be also taken into account	
Germany	62	II	24	Where separation by distance alone is claimed as the protection between fire cells within a fire compartment, the fire hazard analysis should demonstrate that neither radiative ~~radioactive~~ nor convective heat transfer effects nor effects by smoke products would jeopardize the claimed separation.	radioactive -> radiative Non-thermal effects by smoke products should also be considered.	X				
USA	37	II	24	Replace "radioactive" with "radiative."	Radiative is the correct word used when describing the heat transfer mechanism.	X				
China	61	II	25	FROM: "Access and escape routes should be clearly and permanently marked and should be easy to recognize. The markings should show the shortest possible safe routes." TO: Access and escape routes should be clearly and permanently marked and should be easy to recognize. The routes should be optimized to be the shortest possible safe routes."	Up to now, it is difficult to achieve the requirement of marking on site.			X	The second sentence is focusing on the markings, which should show the shortest possible safe routes.	
WNA	88	II	25	…..building should be provided. ~~For each route the following general conditions should be met:~~Following nuclear power plant specific conditions shall be considered:… (a) ….	The recommendations shall not detail conventional fire protection rules. Delete (a) to (j), (l) and (m). Keep only (k)			X	Consistency with NS-G-1.7. Please consider that all the bullets are applicable to a nuclear power plant as well.	
USA	38	II	26	Sections under "Protection against Electrical Cable Fires," need to discuss the impact of fire on fiber optic cable.	This addition is needed to clarify different failures or impacts due to fire using fiber optic cable			X	The comment does not clarify what is specific to fiber optic cables and does not propose alternative text.	
WNA	89	II	28	….. of cable fires as follows: ~~(a) Providing fire protection to limit fire propagation;~~ (b) Providing segregation between cables from redundant divisions of safety systems, and (c) Providing segregation between power supply cables and control cables so far as reasonably practicable. Where segregation is not possible, separation may be appropriate.	(a) is trivial and the main scope of this document. (b) is already covered by the separation of redundant items of safety groups			X	Consistency with NS-G-1.7.	
France - IRSN	100	II	29	…imposed on the quantities of combustible cables ~~insulation~~ (e.g. polymer insulated) installed on cable trays and within cable rout….			X imposed on the quantities of combustible cables ~~insulation~~ (e.g. polymer insulation) installed on cable trays and within cable rout….			
UK	81 (Framatone)	II	29	…imposed on the quantities of combustible cable insulation installed on cable trays and within cable rout….			Ximposed on the quantities of combustible cable insulation (e.g. polymer insulation) installed on cable trays and within cable rout…		Better with an example.	
WNA	90	II	29	…imposed on the quantities of ~~polymer insulated~~combustible cables ~~insulation~~ installed on cable trays and within cable rout….			X imposed on the quantities of combustible cables insulation (e.g. polymer insulation) installed on cable trays and within cable rout…		Better with an example: cable insulation.	
France - IRSN	101	II	30	While details of qualification tests for fire retardant electrical cables vary according to national standards, large scale flame propagation tests for cables often involve vertical or horizontal cable samples exposed to a flaming ignition source. Among the important variable factors associated with cable fire tests are: − Cable inventory as an ignition source, − Cable layout, − ~~Resistance to ignition,~~ − Extent of fire propagation, − Air flow rate, − effects of confinement induced by the walls, − Thermal isolation of the enclosure, − Toxicity and corrosiveness associated with smoke formation. Particular attention should be paid to configurations with multiple cable trays.	These qualification also concern horizontal cable trays configurations. The OECD Prisme-2 program shows that resistance to ignition is not one of the most important parameter of fire cables trays. This program also shows that standards tests are not sufficient to take into account all the physical phenomena which occur in confined/ventilated atmosphere.	X		X	The factors given are not ranked.	
China	7	II	31	Some detailed measures are suggested to be given in this safety guideline or in the safety guideline of electrical design.	Since the specific passive protection measures, which might be necessary to protect electrical cables from fire, can lead to overheating of the cable and degrading of the current load, detailed measures to take these factors into accounts should be given in the safety guide or in this safety guide of electrical design			X	This safety guide is not relevant for such detailed recommendation and refers to SSG-34.	

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China	8	II	33	...., but rather the adequacy of the separation should be determined by making a careful analysis (experiments or simulation) of particular situations.	Give the analysis methods			X	This safety guide tries to avoid restrictions in the methods and keeps flexibility.	
Russia - Rostechnadzor	10	II	33	damage to ~~redundant~~ items important to safety due to a single credible fire. It is not possible	In line 3 of this paragraph, it is necessary to make the same corrections as well as in the comment 8 and for the same reason.			X	Consistency with NS-G-1.7	
China	62	II	35	FROM: "The nature of the fire detection and alarm systems, their layout, the necessary response time and the characteristics of their detectors, including their diversification, should be determined by the fire hazard analysis." TO: "The nature of the fire detection and alarm systems, their layout the necessary response time and the characteristics of their detectors, including their diversification, should be determined by the fire hazard analysis or system design requirement"	Normally, the necessary response time is determined by the system designer and described in the system design manual.		X		With modification as follows: System design requirements for the fire detection.....should be determined by the fire hazard analysis.	
China	9	II	38	Individual detectors should be sited so that the flow of air due to ventilation or pressure differences necessitated for contamination control will not cause smoke or heat energy to flow away from the detectors and thus unduly delay actuation of the detector alarm. Fire detectors should also be placed in such a way as to avoid spurious signals due to air currents generated by the operation of the ventilation system	This should be verified by in situ testing". Due to lack of the suitable testing equipment, it is hard to conform.		X		With modifications to emphasize the in situ testing: "This should be verified by in situ testing where feasible".	
France - IRSN	102	II	40	When items such as fire pumps, water spray systems, ventilation equipment and fire dampers are controlled by fire detection systems, and where spurious operation would be detrimental to the plant, operation should be controlled by two diverse means of detection operating in series. The design should allow the operation of the system to be stopped if the actuation is found to be spurious. The design of the servo should also take into account the possible disturbance of a detector.				X	The whole para. II.40 was deleted as already reflected in para 4.26. Anyway the proposed addition is too specific to be accepted.	
WNA	91	II	40		Delete as it is described in 4.26.	X				
WNA	92	II	41	…actuation systems should be: − Protected from the effects of fire by a suitable choice of cable type, by proper routing, by a looped configuration or by other means;	The first bullet might be more that a damage in the wiring caused e.g. by fire, mechanical damage etc. shall not result in the interruption of detectors or actuation systems. Looped configuration or fire resistance are design solutions.			X	The comment is not clear	
Poland	26	II	42	"SELECTION OF DETECTOR TYPES AND LOCATION OF DETECTORS"	1) Subsection title font type is different than is used for other subsections titles (subsection level is unclear). Subsection title font type should be unified in the entire document (see, for example, the subsection titles written before paragraph II.44). 2) Paragraphs II.42 and II.43 does not provide any information regarding existing detector types, and any recommendations regarding selection, location or positioning of detectors, though here supposed to be provided such information regarding of the subsection title. Safety guide should be supplemented by clear recommendations how based on existing factors fire detector type should be selected and how based on fire detectors response to determine proper position or location of the detector.	X		X	Paragraph II.42 provides main factors to be taken into account for the selection and positioning of the detectors. This safety guide is addressing many types of hazards; if for each hazard, detailed examples should be given, the safety guide will be so thick and lose its interest.	
Russia - Rostechnadzor	11	II	45	hazard that is being protected against and for protected items important to safety. For example, fire extinguishing systems protecting redundant division of safety system should be fully independent of each other.	Design criteria for fire extinguishing means have to consider not only features of fire hazard, but also feature of those items important to safety which are subject to protection.			X	The idea expressed in the reason is reflected in 'so to ensure that the design is appropriate for each fire hazard that is being protected against". This means that consideration is given to the design at large, including the features of items important to safety being protected.	
WNA	93	II	46		The paragraph is confusing. The objective is more that the operation of extinguishing system shall not jeopardize the required safety functions but not the safety function of dedicated SSC. The intrinsic request is the reparation of the respective redundant train of the safety system from the effects of fire extinguishing system.			X	No proposal of alternative text.	
France - IRSN	103	II	48	In the selection of the type of extinguishing system to be installed, consideration should be given to the necessary response time, the characteristics regarding its capability for extinguishing a fire (e.g. thermal shock) and the consequences of operation of the system for people and for items important to safety as established by the fire analysis.	The term "suppression characteristics" is not clear. Proposition to replace by "characteristics regarding its capability for extinguishing a fire"	X				
France - IRSN	104	II	49	…spreading rooms and storage areas, and to protect equipment containing large quantities of oil, such as turbogenerators….. ….Water mist and foam systems are more complex but have the advantage of discharging smaller quantities of water to achieve control. The system reliability of the system and the advantage of reduced water amount should be balanced. Gaseous extinguishing systems are usually used in locations containing control cabinets and other electrical equipment susceptible to water damage.	It should be kept in mind that extinguishing primary extinguish fires or limit their size. This indeed a protection measure but the description gives the impression that extinguishing systems protection function is protect items rather to extinguish fires. Spray deluge system may provide such function as being pre-activated providing a "cooling barrier", for sprinkler system is this questionable. Foam system are also "more complex" and have the same advantage like water mist systems. Complex systems might lead to an higher failure rate.		X Water mist and foam systems are more complex. Water mist has the advantage of discharging smaller quantities of water to achieve control.	X	More precise wording. The reliability of a complex system is not necessarily less than for a simple system.	
UK	82 (Framatome)	II	49	…spreading rooms and storage areas, and to protect equipment containing large quantities of oil, such as turbogenerators….. ….Water mist and foam systems are more complex but have the advantage of discharging smaller quantities of water to achieve control. The system complexity with its higher failure probability and the advantage of reduced water amount should be balanced. Gaseous extinguishing systems are usually used in locations containing control cabinets and other electrical equipment susceptible to water damage.	It should be kept in mind that extinguishing primary extinguish fires or limit their size. This indeed a protection measure but the description gives the impression that extinguishing systems protection function is protect items rather to extinguish fires. Spray deluge system may provide such function as being pre-activated providing a "cooling barrier", for sprinkler system is this questionable. Foam system are also "more complex" and have the same advantage like water mist systems. Complex systems might lead to an higher failure rate.		X Water mist and foam systems are more complex. Water mist has the advantage of discharging smaller quantities of water to achieve control.	X		

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WNA	94	II	49	…spreading rooms and storage areas, and to protect equipment containing large quantities of oil, such as turbogenerators….. ….Water mist and foam systems are more complex but have the advantage of discharging smaller quantities of water to achieve control. The system complexity with its higher failure probability and the advantage of reduced water amount should be balanced. Gaseous extinguishing systems are usually used in locations containing control cabinets and other electrical equipment susceptible to water damage.	It should be kept in mind that extinguishing primary extinguish fires or limit their size. This indeed a protection measure but the description gives the impression that extinguishing systems protection function is protect items rather to extinguish fires. Spray deluge system may provide such function as being pre-activated providing a "cooling barrier", for sprinkler system is this questionable. Foam system are also "more complex" and have the same advantage like water mist systems. Complex systems might lead to an higher failure rate.		X Water mist and foam systems are more complex. Water mist has the advantage of discharging smaller quantities of water to achieve control.	X	The reason is to lavoid initiation of other fire (cable fire, oil fire) or even explosions. More precise wording. The reliability of a complex system is not necessarily less than for a simple system.	
China	10	II	52	The provision of confirm the fire withstanding time period is suggested to be given in the guideline.	How to confirm the fire withstanding time period. The fire withstanding time period should be given in the guideline.			X	The withstanding time is defined by the objective of being sufficient to allow for the manual actuation. It is beyond the scope of this Safety Guide to prescribe or even to recommend a numerical value.	
France - IRSN	105	II	56	Water based extinguishing systems should be permanently connected to a reliable and adequate supply of fire extinguishing water (for automatic systems).	This point concern automatic systems			X	Not only valid for automatic systems; it is laso valid for remote controlled system.	
WNA	101	II	57	….at all locations where one of the following factors applies: A fire could compromise redundant items important to safety; ……	The main fire protection safety features relies on fire confinement. The bullets shall be deleted or shall be mentioned more weakly. It shall not generate a request for compartmentation and additional extinguishing systems. Keep in mind the fire barrier shall resist against the fire without the extinguishing system.			X	Consistency with NS-G-1.7.	
France - IRSN	106	II	62		Delete it is only a flooding and containment integrity concern. Here no design solution shall be presented			X	See resolution of similar comment from ENISS.	
USA	39	II	62	Replace "de-energized" with "dry."	De-energized is not a term used to describe water piping.			X	Please note that we are using the same text as in NS-G-1.7. If 'dry' is used, then (dry risers) should be removed.	
WNA	95	II	62		Delete it is only a flooding and containment integrity concern. Here no design solution shall be presented			X	The reason is quite confusing	
USA	40	II	63	Revise to read: "…should adequately provide for exterior firefighting operations on all buildings."	It is not clear what is meant by "coverage" or what "the building" is.	X				
WNA	96	II	63	The distribution loop for….	The paragraph contains a design solution to a requirement. A loop is the consequence on the request that if a part of the water supply fails, water supply to the building shall not be effected. A small description might be necessary, or the intrinsic requirements shall be mentioned (this would be the best)		X		Please refer to the integrated resolution of other similar comments.	
WNA	97	II	67	The main loop of the water…	See comment n°96 on II.63				See WNA comment 96.	
Poland	27	II	69	"The main primary purpose of the water system for the fire extinguishing system ~~should be used only~~ is to supply water for fire extinguishing. This water system should not be connected into the piping of the service water or sanitary water systems except as a source of backup supplies of firefighting water or to perform a safety function during severe accident (DEC) to mitigate an accident condition…"	How it is originally written, looks like first sentence contradicts with second. In order to resolve contradiction it is proposed to clarify "main primary purpose" of the fire extinguishing system as 1st sentence. In 2nd sentence it should be clarified the fire extinguishing system usage as water supply source in severe accidents (DEC). It should be clarified and additional details and recommendations should be provided regarding fire extinguishing water system connection points to service water and reactor cooldown emergency systems. The recommendations regarding location and accessibility of isolating valves (automatic or manual control) should be also provided in the safety guide.			X	The first sentence means that the water system for the fire extinguishing system needs to be used exclusively for fire extinguishing. The second sentence explains the consequences of the first sentence in terms of connections to other water systems, and by identifying one exception. There is no contradiction between the first and second sentence. There is no need to add severe accident as it is covered by accident conditions.	
WNA	98	II	70	..fire extinguishing water main loop could serve…	See comment n°96 on II.63				See WNA comment 96.	
UK	83 (BAE)	II	72	Change wording "…flow rate at the necessary pressure for the minimum period of time" to "…flow rate at the necessary pressure for the **maximum** period of time required **to bring the fire under control**."	The sentence appears to be misleading or lacking completion.		X flow rate at the necessary pressure for the **minimum** period of time required **to bring the fire under control**.		One needs to control the fire in a minimum time. This is consistent with NS-G-1.7, para. 5.39. Check with others.	
China	11	II	81	Some detailed measures are suggested to be given in this safety guideline or in the relevant safety guidelines.	(e) if any detail exact consideration could be given to the potential damage due to thermal shock when gaseous extinguishing systems are discharged directly onto equipment important to safety.			X	There is enough details at the level of a safety guide. Further details could be provided later in relevant Tecdocs or safety reports.	
Poland	28	II	81	"Considerations for gaseous fire extinguishing systems are as follows: … (e) Consideration should be given to the potential for damage due to thermal shock (?) when gaseous extinguishing systems are discharged directly onto equipment important to safety…"	It is unclear how gaseous fire extinguishing systems can cause thermal shock. Gaseous extinguishing systems do not provide cooling (see II.78) and as of that can't cause a thermal shock effect by rapid cooldown. Thermal shock effect might be more important for water extinguishing systems. This issue requires clarification and explanation how gaseous fire extinguishing system can cause thermal shock effect. Any contradiction with paragraph II.78 should be eliminated or clarified as well.			X	Consistency with NS-G-1.7. See also para. II.48.	
UK	85 (BAE)	II	82	Additional clause "(e) Consideration should be given to the provision of suitable breathing apparatus or self-rescue sets."	Personnel required to enter the area may need to be provided with breathing apparatus.			X	The list is not comprehensive and includes only general design conditions. It is expected that suitable breathing apparatus are available like in any plant.	
UK	86 (BAE)	II	85	Additional clause. "Where dense gases are used as extinguishant, the transfer routes of the gas to lower levels of the building should be assessed to ensure that safe escape routes remain available."	Heavy gases (such as carbon dioxide or argon) could potentially enter lower levels of the building, which could be a safety risk to personnel (asphyxiation).			X	Covered by II.83.	
UK	87 (BAE)	II	88	Additional words "The consequential clogging of **ventilation system** filters should also be taken into account."	Assume this is the type of filter implied. If not, it may be necessary to specify exactly which type of filters are affected.		X The consequential clogging of filters, e.g. ventilation system filters, should also be taken into account.		Not only ventilation system filters are concerned.	

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Poland	29	II	97	"Portable and mobile extinguishers filled with water or foam solution and other extinguishing agents with a neutron moderating capability should not be used in locations where nuclear fuel is stored, handled or passes in transit unless an assessment of the criticality hazard has demonstrated that it is safe to do so."	This paragraph provides precautions only for portable and mobile extinguishers filled with water or other agents with a neutron moderating capability. Proper clarification should be provided regarding usage of a fixed (installed) water or other moderating agent extinguishing systems in fuel storage, handling and transferring areas, including usage of water supply hoses. What nuclear safety precautions should be considered in this case?			X	The comment is covered in a general by para. 4.19.	
ENISS	71	II	102	II.102. Alternative communication equipment such as two way radios should be provided in the control room and at selected locations throughout the plant. In addition, portable two way radios should be provided for the firefighting team. ~~Prior to the first fuel loading, testing should be carried out to demonstrate that the frequencies and transmitter powers used will not cause spurious operation of the protection system and control devices.~~	This last sentence seems too vague and detailed for this appendix on "DETAILED GUIDANCE ON INTERNAL FIRES", the reference [12] quoted in the previous paragraph seems sufficient in terms of design guidance for communication system.	X				
China	12	II	106	An assessment should be carried out to determine the need for smoke control and heat venting, including the need for dedicated positive pressure air supply system for evacuation passageway, smoke and heat extraction systems, to…	Positive pressure air supply system for evacuation passageway should be considered as well.		X … the need for venting smoke and heat…		more precise wording	
UK	88 (Framatone)	II	108	Subject to the findings of fire hazard analysis, consideration the following locations should have provisions for smoke and heat venting: Areas containing a high fire load due to electrical cables; − Areas containing a high fire load of flammable liquids; − Areas containing items important to safety (including those applied under design extension conditions) that are normally occupied by operating personnel (e.g. the main control room).	added sentence from similar paragraph elsewhere (subject to the findings of the fire hazard analysis…)			X	The comment and the reason are not clear.	81, similar comments and similar proposed texts
WNA	100	II	108	…compartment.	Only those areas which generate a huge heat load to the structure exceeding their limits and fire loads which can release extensive amounts of smoke should be mentioned. This is already described in II.106. and II.107. No preselection shall be done. They are only potential candidates.			X	The comment and the reason are not clear.	
UK	74 (Framatone)	II	II	*Fire ~~compartment~~ confinement approach* With this approach, fire is confined inside a dedicated area enclosed by fire barriers (i.e. fire compartment)	Title shall be modified. Original description in NS-G-1.7 is good as it describes that the fire is enclosed inside a specific enclosure. A small description is necessary to describe this. It might also possible to shift II.16. before II.14. in order to have a small introduction of fire compartments. It is recommended however to rename the title from *Fire compartment approach* Into *Fire confinement approach*		X		Fire containment is the wording used in NS-G-1.7	86, same as UK79
UK	80 (Framatone)	II	II	*Fire influence approach* Fire influence approach: By this approach redundant items of a safety group are spacious separated by distance. Fire cells are separate areas that may not be completely enclosed by fire barriers, but the propagation of flames and other products of combustion between fire cells are severely limited	Title shall be modified. Original description in NS-G-1.7 is good as it describes the relation between fire source and the target . A small description is necessary to describe this. Please note the need for consistency previously highlighted: fire confinement and fire influence approach. Fire confinement delivered by fire compartments total burnout and fire influence by fire cells		X			
China	63	II		Suggest to replenish the fire protection requirements of ventilation system.	This part is missing in Appendix II.			X	Recommendations related to the ventilation system are provided in the main body of the safety guide. There is no need to provide further details in the Appendix.	78 (similar comments but quite different proposals, trains vs. divisions)
WNA	81	II		*Fire ~~compartment~~ confinement approach* With this approach, fire is confined inside a dedicated area enclosed by fire barriers (i.e. fire compartment)	Title shall be modified. Original description in NS-G-1.7 is good as it describes that the fire is enclosed inside a specific enclosure. A small description is necessary to describe this. It might also possible to shift II.16. before II.14. in order to have a small introduction of fire compartments. It is recommended however to rename the title from *Fire compartment approach* Into *Fire confinement approach*	X				85, same as FR97
WNA	87	II		*Fire ~~cell~~ influence approach* Fire influence approach: By this approach redundant items of a safety group are spacious separated by distance. Fire cells are separate areas that may not be completely enclosed by fire barriers, but the propagation of flames and other products of combustion between fire cells are severely limited	Title shall be modified. Original description in NS-G-1.7 is good as it describes the relation between fire source and the target . A small description is necessary to describe this.		X		The elements in the proposal are already reflected in para. II.22.	
France - IRSN	107	II75	75	The water supply ~~for~~ ~~sprinkler~~for fixed extinguishing systems might necessitate chemical treatment and additional filtration to ensure that no blockage of the sprinklers or nozzles occurs from the effects of debris, biological fouling or corrosion products.	The necessity of chemical treatment and filtration is not depending on the type of system. It depends on the type of components sprinkler and nozzles with their "small" drillings and the available water quality.		X The water supply fixed extinguishing systems might necessitate chemical treatment and additional filtration to ensure that no blockage of the sprinklers or their nozzles occurs from the effects of debris, biological fouling or corrosion products.		Better wording	
UK	84 (Framatone)	II75	75	The water supply for fixed extinguishing systems might necessitate chemical treatment and additional filtration to ensure that no blockage of the sprinklers or nozzles occurs from the effects of debris, biological fouling or corrosion products.	The necessity of chemical treatment and filtration is not depending on the type of system. It depends on the type of components sprinkler and nozzles with their "small" drillings and the available water quality.	X				
WNA	99	II75	75	The water supply ~~for sprinkler~~ for fixed extinguishing systems might necessitate chemical treatment and additional filtration to ensure that no blockage of the sprinklers or nozzles occurs from the effects of debris, biological fouling or corrosion products.	The necessity of chemical treatment and filtration is not depending on the type of system. It depends on the type of components sprinkler and nozzles with their "small" drillings and the available water quality.	X			.	
China	60	II	24	FROM: "Where separation by distance alone is claimed as the protection between fire cells within a fire compartment, the fire hazard analysis should demonstrate that neither radioactive nor convective heat transfer effects would jeopardize the claimed separation." TO: "Where separation by distance alone is claimed as the protection between fire cells, the fire hazard analysis should demonstrate that neither radioactive nor convective heat transfer effects would jeopardize the claimed separation."	Same reason as Appendix II.23.	X				

Member State	Comment number	Section	Para	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection	information from integrated list
Germany	57	New Paragraph	New Paragraph	Equipment and systems important to safety, including associated cables, should work reliable in the electromagnetic environment in which they are located. The electromagnetic compatibility of equipment should be demonstrated in dependency of their importance to safety by an analysis. Further, the protection of equipment against electromagnetic interferences should be adapted to changes in the environmental conditions as far as necessary. It should be verified that the electromagnetic emissions of equipment will not impermissibly influence other equipment or components at the place of installation.	Missing points. It is proposed to add after para 4.199 to the chapter "**Hazard specific considerations"**			X	All these considerations are included in SSG-34 and SSG-39, both of them referenced in this section.	
Poland	10	Para Missiles	Para Missiles	INTERNAL MISSILES	To avoid military association, please add "INTERNAL".	X				
ENISS	72	References	References	[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Protection against Internal Hazards other than Fires and Explosions in the Design of Nuclear Power Plants, IAEA Safety Standards Series No. NS-G-1.11, IAEA, Vienna (2004) (superseded by the current Safety Guide) ~~(a revision of the publication is in preparation)~~ [3] INTERNATIONAL ATOMIC ENERGY AGENCY, Protection against Internal Fires and Explosions in the Design of Nuclear Power Plants, IAEA Safety Standards Series No. NS-G-1.7, IAEA, Vienna (2004) (superseded by the current Safety Guide) ~~(a revision of the publication is in preparation)~~ [10] INTERNATIONAL ATOMIC ENERGY AGENCY, Design of Reactor Coolant System and Associated Systems in Nuclear Power Plants, IAEA Safety Standards Series No. NS-G-1.94, IAEA, Vienna (2004). (A revision of this publication is in preparation)	References [2] and [3] are superseded by DS494. Therefore, they are not under "revision". [10] Mistake on the SS reference (NS-G-1.9 and not NS-G-1.4)	X		X	DS494 is still a draft and cannot supersede NS-G-1.7 and NS-G-1.11. Which one is referenced in footnotes in the revised version of DS494	
Russia - Rosenergoatom	9	section INTERNAL FLOODS	section INTERNAL FLOODS		We recommend to add section INTERNAL FLOODS with a specific requirement on prevention in the NPP design of scenario of flooding of main and supplementary control rooms as a consequence of a pipe break			X	We do not see why specific recommendations should be made in the case of internal flooding. Instead, there is a general design consideration, applicable to all internal hazards, in para. 2.12, bullet (e).	