MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
1	UNRC	1	5	1.5	First sentence add, "**during all modes of operation**"	Clarification.	X			
1	Germany	1	8	1.8	… Section 4 provides specific recommendations for protection against fires, explosions, missiles, pipe breaks, flooding, collapses of structures and falling objects with a focus on heavy load drop, electromagnetic interference, and release of hazardous substances ~~inside the plant~~ originating within the site boundary. …	Consistency with paragraphs 1.2, 1.,5 and the definition provided in par. 2.5.	X			
24	UNRC	2	4	2.4	An item important to safety is 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 [2]. In accordance with this definition, and the definition of design extension conditions in SSR-2/1 (Rev. 1) [1], safety features for design extension conditions are items important to safety. Therefore, safety features for design extension conditions need to be designed or protected against **applicable** internal hazards. In addition, safety features for design extension conditions could be sources of internal hazards that need to be considered.	Add 'applicable' to clarify scope.	X			
2	UNRC	2	7	2.7	Internal hazards can also be generated by external hazards (e.g. an earthquake followed by an internal flood, **an earthquake causing a fire, etc.**).	Seismically-induced fires should be included in the risk analysis and needs to be addressed here.		X Internal hazards can also be generated by external hazards (e.g. an earthquake followed by an internal flood, an earthquake causing a fire)		Better wording. This is not an exhaustive list
1	ONR/UK	2	9	2.9	Some potential combinations of hazards (see Appendix I) are also considered within the scope of this Safety Guide	Not all credible combinations considered in Appendix I. This is plant and site specific			X	While recognizing that the credible combination is site and plant design specific (see para. I.2), Appendix I explains how all credible combinations can be determined for a given site and given design.
2	Germany	2	11	2.11	While it might not be practical or possible to prevent an internal hazard from triggering an anticipated operational occurrence, one of the objectives of layout and design of the nuclear power plant is to ensure, to the extent practicable, that internal hazards do not trigger an accident condition.	According to the safety glossary the term 'accident conditions' for the plant states (DBA and DEC) shall be applied. This was already accepted in the Step 11 table of MS comments resolution.			X	It is true that adding 'condition' was accepted in the Step 11 table of MS comments resolution. However, as underlined in the note at the top of that table, some changes occurred after the internal review and technical editing. Regarding this specific case, it was agreed that adding 'condition' will limit to the DBA and

MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
1	Korea	2	13	2.13	Proper surveillance and in-service inspections of SSCs need to be implemented for early detection of the occurrence of an internal hazard (or of signs that can lead to the occurrence of an internal hazard) and implementation of necessary corrective actions to ensure protection against the hazard**: see Requirement 31 of SSR-2/2 (Rev. 1) [24]**.	The prevention and mitigation of internal hazards is related with keeping the requirement 31 of SSR-2/2.			X	Requirement 31 of SSR-2/2 (Rev.1) applies to many aspects of the design and it is not specific to internal hazards. In addition, if a requirement needed to be referred to, Requirement 29 of SSR-2/1 (Rev.1) would be better.
2	ONR/UK	3	2	3.2 (a)	(a) Identification of internal hazards and credible combinations of hazards, and characterization of the unmitigated worst effects of the hazard(s);	Unmitigated effects aid the classification of the safety measures			X	At this stage, we are concerned with all the effects, including the unmitigated worst ones.
3	Germany	3	7	3.7	Possible combinations of events from combined internal–internal and internal–external ~~events~~ hazards and any consequential effects (e.g. high energy pipe break, spray, pipe whip) are required to be considered in the design of the plant: see para. 5.32 of SSR-2/1 (Rev. 1) [1]…..	Wording “internal events” is misleading, these are not internal hazards but plant internal events.		X Possible combinations of internal–internal and internal–external hazards and any consequential effects (e.g. high energy pipe break, pipe whip, jet effect, flooding) are required to be considered in the design of the plant: see para. 5.32 of SSR-2/1 (Rev. 1) [1]		Better formulation as the first part of the proposed text is confusing. This formulation takes also into account Korea comment No.3.
3	Korea	3	7	3.7	Possible combinations of internal–internal and internal–external events and any consequent effects (e.g. high energy pipe break, ~~spray,~~ pipe whip, **jet effect, flooding**) are required to be considered in the design of the plant: see para. 5.32 of SSR-2/1 (Rev. 1) [1].	For keeping constancy with the expression using in this document		X Possible combinations of internal–internal and internal–external hazards and any consequential effects (e.g. high energy pipe break, pipe whip, jet effect, flooding) are required to be considered in the design of the plant: see para. 5.32 of SSR-2/1 (Rev. 1) [1]		Better formulation taking into account Germany comment No.3.
4	UNRC	3	22	3.22	Comment: What about multiple unit sites with shared systems?	Shared system failures should to be addressed.				Please refer to para. 3.32.
3	UNRC	3	23	3.23	An assessment should be made to demonstrate that the internal hazards relevant to the design of the nuclear power plant have been considered, that provisions for prevention, **detection,** and mitigation have been designed with sufficient safety margins to address the uncertainties in the identification and characterization of internal hazards and their effects, as well as for the avoidance of cliff-edge effects.	Clarification.			X	Detection is part of mitigation; see for example fire mitigation starting from para. 4.18.
3	ONR/UK	3	24	3.24	…… that the boundary conditions and assumed configuration of plant systems used in the analysis of the corresponding accident are not affected by the loads resulting from the internal hazard	Need some clarification			X	Configuration of plant systems is part of the boundary conditions.

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6	ONR/UK	3	24	3.24	… that the boundary conditions, in particular for systems credited in the accident analysis, are not affected by the hazard and that the assumed configuration of plant systems are unchanged. …	Need some clarification			X	See resolution of UK comment No. 3
1	Japan	3	28	3.28	For internal hazards that do not trigger, or result from, an anticipated operational occurrence or an accident, an assessment should be performed to demonstrate that the plant can be brought to, and maintained in, a safe state even in the event of a single failure, including when equipment is unavailable due to preventive maintenance or out of service owing to allowed outage time defined in OLC. In practice, a functional analysis is normally performed to demonstrate that enough redundant systems remain available to reach and maintain a safe state.	Unavailability of equipment may include out of service owing to allowed outage time defined in operational limits and conditions.		X For internal hazards that do not trigger, or result from, an anticipated operational occurrence or an accident, an assessment should be performed to demonstrate that the plant can be brought to, and maintained in, a safe state even in the event of a single failure, including when equipment is unavailable due to preventive maintenance considered in the design. In practice, a functional analysis is normally performed to demonstrate that enough redundant systems remain available to reach and maintain a safe state.		More general formulation, which is also incorporated in para. 3.29.
4	ONR/UK	3	29	3.29	*IAEA to review comment and update text as appropriate.*	*"In such cases, the analysis of the internal hazards is limited to a functional analysis that should demonstrate that an adequate number of functions to control anticipated operational occurrences are provided by the design"* Should the highlighted text be the same as in 3.28? If not, can you clarify why for high frequency hazards the focus is on the effects on redundant systems, whereas the hazards that could cause a reactor fault or result from one, the focus is on the functions.				See the origin of this modification. In principle, the text should be the same: that an adequate number of functions to control anticipated operational occurrences and to reach and maintain a safe state are provided by the design.
5	ONR/UK	3	30	3.30	*IAEA to review comment and update text as appropriate.*	*"A specific accident analysis is normally not necessary as this is provided by the corresponding accident analysis in which the rules for design basis accidents or the rules for design extension conditions without significant fuel degradation should be applied, as appropriate"* How this will be done in practice. What is the advice here for the IH				There is no advice. It is just a statement for clarification.
4	Germany	4	5	4.5	Several measures should be taken in the design to minimize the likelihood of internal fires, as follows: (a) Removal, minimization and segregation of ~~fixed and transient~~ permanent and temporary fire loads, as far as practicable;	Clarification and more precision in wording, used in other regulatory documents as well, maybe a footnote could state that sometimes also the terminology "fixed and transient fire loads" is used			X	The reviewer agrees that 'fixed and transient' is used. Moreover, 'fixed and transient' was used in NS-G-1.7; therefore, there is no need for this change.

MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
5	UNRC	4	16	4.16	Add, **"other potential ignition sources such as motor control centers, load centers, switchgear, switches, and transformers should be enclosed in appropriate enclosures to prevent propagation of fire."**	Some question on fire propagation through panel ventilators or loosely fitted doors without any gasketing or fire-retardant material.			X	This addition does not fit here (Minimizing ignition sources) because it is about measures to prevent fire propagation.
6	UNRC	4	17	4.17 4.17/4.49	Add, "**Cable routing details through raceways and fire zones should be maintained during the life of the plant**".	Support of future hot short analyses Maintain design configuration information for assessing potential safety impact of proposed future plant modifications.			X	This recommendation is not specific to cable routing details as the management of design configuration information during plant life should be done for all equipment important to safety.
5	Germany	4	24	4.24	The control of fire is achieved through a combination of fixed fire suppression and extinguishing systems and equipment and manual fire-fighting capabilities…..	Clarification in consistency with Appendix, systems alone is not enough, standpipes and hydrants are equipment as mentioned there.	X			
6	Germany	4	29	4.29	Systems and equipment for ~~The~~ fire suppression and fire extinguishing including manual firefighting equipment should be of sufficient capacity to ensure that later fires caused by re-ignition (e.g. due to hot materials) are prevented.	Clarification and consistency in document, cf. 4.24, the original txt does not cover all means.	X			
7	UNRC	4	34	4.34	Add, "**Fire penetration seals should be accessible for inspection or maintenance throughout the life of the plant**".	From operating experience, Seal degradation has become an issue over the years.			X	See end of para. 4.33.
7	Germany	4	40	4.40	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 will not propagate fire effects that induce a loss of ventilation of another safety fire compartment. Parts of the ventilation system (e.g. connecting ducts, fan rooms ~~and~~ ~~filters~~) that are located ~~situated~~ ~~outside the~~ in an adjacent 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. These should operate automatically, where appropriate.	Clarification, as filters cannot be rated and for consistency in document	X			Please note that the initial formulation is consistent with NS-G-1.7, para. 6.6.

MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
8	Germany	4	42	4.42	… , the reaction between ~~overheated~~ burning charcoal and water …	"overheated" makes no physical sense in this context		X …the reaction between charcoal burning at high temperature and water…		The notion of high temperature should appear.
7	ONR/UK	4	53	4.53	Redundant divisions of safety systems should be located as far apart as practicable and should be protected, where possible, by passive protection measures such as partial fire enclosures and cable fire protection systems.	Multi-leg/defence in depth arguments are expected to be required in such areas.	X			
2	Japan	4	54	4.54	4.54 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 (e.g. oil pans). The oil collection systems should be capable of collecting oil and water from all potential leakage points or discharge points and draining these to a vented container or another safe location. 4.56. The turbine building could contain items important to safety. Fire compartmentation might be difficult in some areas, and substantial fire loads are present such as large inventories of flammable materials in the lubricating, cooling and hydraulic systems of the steam turbine(s) and in the hydrogen atmosphere within the generator(s). Consequently, in addition to fire suppression systems, adequate oil collection systems (e.g. oil pans) should be provided for all equipment containing flammable liquids. The use of flammable hydrocarbon based lubricating fluids should be minimized. If flammable liquids have to be used, they should be liquids with high flashpoints, consistent with operational needs.	Oil pans are taken as an example of oil collection systems.	X			
3	Japan	4	58	4.58	~~Elements of t~~The systems used for long term heat removal from the containment during severe accidents should be redundant or diverse and located in different fire compartments.	Diverse systems should also be considerd to increase the flexbility of the design for long term heat removal system during severe accidents.		X Equipment of the systems used for long term heat removal from the containment during severe accidents should be redundant or diverse and located in different fire compartments.		Wording similar to the one in 4.59.
8	ONR/UK	4	61	4.61	Chemical explosions (typically explosions of gas mixtures), boiling liquid expanding vapour explosions induced by fire exposure, oil mist, blast from pressure vessel failure and high energy arcing faults6 accompanied by rapid air expansion and plasma build-up, should be considered.	Oil mist and pressure vessel failure are also credible. Missiles from pressure vessel failure are considered and so should be the sudden release of energy.	X			
9	Germany	4	63	4.63	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) that protect items important to safety against other internal hazards. ~~Flammable and combustible~~ Such materials should also be excluded from areas adjacent to such compartments or areas connected to these compartments by ventilation systems. …	Text in the second sentence is misleading: This sentence is about materials that "could produce or contribute to explosive mixtures". Therefore, the complete list of materials in the first sentence must be referred to by "such".		X 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) that protect items important to safety against other internal hazards. Such flammable gases, liquids and combustible materials should also be excluded from areas adjacent to such compartments or areas connected to these compartments by ventilation systems.		More clear formulation.

MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
10	Germany	4	63	4.63	… *Wherever* this is not practicable, quantities of such materials should be strictly limited, adequate storage facilities should be provided~~,~~. ~~and~~ Rreactive substances, oxidizers and combustible materials should be segregated from each other.	The last sentence about segregation of oxidizers and combustible materials is always required and should stand alone. The requirement is not part of an alternative requirement *"Wherever this* "…. 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		X *Wherever* this is not practicable, quantities of such materials should be strictly limited and adequate storage facilities should be provided~~.~~ Reactive substances, oxidizers and combustible materials should be segregated from each other.		Better formulation
4	Japan	4	72	4.72	The provisions of paras ~~4.71~~ ~~and~~ 4.73 <u>and</u> <u>4.77</u> and should be applied, as appropriate, to the storage.	Correction.		X The provisions of paras 4.66, 4.67 <u>and</u> <u>4.77,</u> and should be applied, as appropriate, to the storage.		More careful check.
11	Germany	4	74	4.74	… The potential for boiling liquid expanding vapour *explosions* from the rapid expansion of ~~*non-flammable fluids*~~ should be minimized by avoiding operation above the superheat limit temperature, as far as practicable.	Please check the technical content of the sentence. A BLEVE of **non**-flammable fluids is physically not possible. Either delete non-flammable fluids or use "flammable liquids" which however is a kind of textual duplication. Moreover, NS-G-1,7 talked about flammable liquids.		X The potential for boiling liquid expanding vapour *explosions* should be minimized by avoiding operation above the superheat limit temperature, as far as practicable		As it is, the proposal is incomplete.
9	ONR/UK	4	79	4.79	The gross failure of pressure vessels, such as the reactor pressure vessel or other high quality vessels designed with large margins, is, therefore, generally believed to be sufficiently improbable that consideration of the rupture of these vessels as an internal hazard is not necessary <u>(subject to justification by the designers)</u>: see IAEA Safety Standards Series No. SSG-56, Design of the Reactor Coolant System and Associated Systems for Nuclear Power Plants [9].	Evidence should be provided for this assertion. Within Reference 9 (Design of Reactor Coolant System and Associated Systems for Nuclear Power Plant SSG-56 in Preparation), there is useful guidance for the RPV, but other smaller pressure vessels may also be within the reactor containment. These may not have such rigorous design requirements, so disruptive failure should be considered or justified if this is excluded.			X	Of course, the designer is required to justify.

MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
10	ONR/UK	4	82	4.82	For this reason, it is generally accepted that the generation of missiles resulting from the failure of the valve body itself is sufficiently unlikely and that this need not be considered in the design and/or evaluation of the plant. <u>However, the designers should justify such a claim.</u>	Evidence should be provided for this assertion.			X	See resolution of previous comment.
12	Germany	4	89	Title before 4.89	*Prevention of failure of valves <u>or bolted connections</u>*	The caption should be changed as this section also addresses any bolted connection of high energy components (e.g. access holes).	X			
11	ONR/UK	4	101	4.101	In the design of barriers, both local and general effects of missiles on the barriers <u>response</u> should be considered, as follows	It is the barriers response that should be considered			X	The proposed text and the reason are not consistent. The effects on the barriers imply the response of the barriers.
12	ONR/UK	4	101	4.101 (a) (vi)	Analysis of the penetration depth, spalling and scabbing phenomena can be performed using empirical formulas <u>or other analytical models as appropriate</u>.	The analysis should not be based on empirical formulas only. There are may be cases that CFD modelling might be required as the empirical formulas may be outside the validation parameters or the results are too conservative.	X			
13	ONR/UK	4	101	4.101 (b) (i)	The design of these barriers should be based on empirical formulas for penetration <u>or other analytical models as appropriate.</u>	As Above	X			
14	ONR/UK	4	102	4.102	Physical <u>segregation</u> of the redundant safety systems will also ensure that safety functions continue to be performed	Segregation is by barriers.			X	We are under the cases without protection by specific missile barriers.
13	Germany	4	107	4.107	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[7] 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. (b) Low energy pipes can also suffer through-wall cracks, either longitudinal or circumferential, although cracks would generally be more stable ~~than ruptures~~, given the energy of the fluid, and dynamic effects would be less significant.	In low energy pipes cracks are more stable than in high energy pipes. Therefore, ruptures are not expected in low energy pipes.		X (b) Low energy pipes can also suffer through-wall cracks, either longitudinal or circumferential, although, given the energy of the fluid, such cracks would generally be more stable than those in high energy pipes, , , and dynamic effects would be less significant.		More clear formulation.
4	Korea	4	107	4.107	[7]A high energy pipe is defined as a pipe with an internal operating pressure of more than ~~2.0~~<u>1.9</u> MPa or an operating temperature of more than ~~100~~<u>95</u> °C in the case of water. Other limits may apply for other fluids, for example gas at greater than atmospheric pressure.	In some states including Republic of Korea, a high energy pipe is defined as a pipe with an internal operating pressure of more than 1.9 MPa or an operating temperature of more than 95 °C in their own regulatory requirements and guides. This definition is more conservative and inclusive than the definition in NS-G-1.11.		X [7] In some States, a high energy pipe is defined as a pipe with an internal operating pressure of more than 1.9 MPa or an operating temperature of more than 95 °C in the case of water. In other States, these limits are 2.0 MPa and 100 °C respectively. Other limits may apply for other fluids, for example gas at greater than atmospheric pressure.		Although it is conservative, the proposed text does not reflect all the cases.

MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
15	ONR/UK	4	108	4.108	Rewritten: An assessment of the consequences assuming a full pipe break can be viewed as a good practice to demonstrate the robustness of the design. This is consistent with guidance given in IAEA Safety Standards Series No. SSG-56, Design of the Reactor Coolant System and Associated Systems for Nuclear Power Plants [9]. However, in some member states, historical precedence and practices consistent with avoiding overly-conservative designs has allowed designers to postulate only a limited leak (and not a break in certain circumstances. These may include: In areas where criteria for excluding certain pipe segments from break analysis have been agreed such as a break preclusion concept, (see para. 4.133). For some piping systems which are considered to be operated under 'high energy' parameters for a short period of time (a typical definition might be less than 2% of the total operating time). There would also be agreement on what constitutes 'high energy' in this context.	See draft SSG-56 paragraph 5.127: 5.127. Regardless of the very low probability of piping failure, the consequences of a double ended break of a pipe should be analysed using appropriate rules regarding: • Core cooling capacity; • Pressure build-up inside the primary containment; • Environmental qualification of equipment. In proposing a paragraph we have tried to move away from the need for the footnotes in the current text.			X	The proposal is longer than the initial text that has the merit to be concise. Additionally, the proposal does not bring added value (except avoiding a footnote) and does include no recommendation.
14	Germany	4	109	4.109	… Other locations <u>of this piping system</u>, where the piping failure would lead to bounding effects in SCCs important to safety, …	Our understanding is that the second sentence of bullet (a) is related to the piping system of the first sentence which should be clarified else "other locations" is not exactly defined.	X			
15	Germany	4	114	4.114	… 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, <u>asphyxiant</u> <u>effects,</u> 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.	This was already ac-cepted in the Step 8 table of MS comments resolution but <u>asphyxiant effects</u> have been dropped.			X	In Step 8, asphyxiant effects were removed because they are relevant only for plant personnel and not for SSCs.
17	ONR/UK	4	116	4.116	Four main phenomena that could be induced by pipe failures are pipe whip, jet effects, <u>steam release</u> and flooding	Why not hot gas release/ steam?			X	Steam release included in the jet effects and flooding, i.e. as long as steam is steam, it is under jet effects; when it is condensed, it is under flooding.
18	ONR/UK	4	121	4.121	Impacted target pipes of a diameter equal to or larger than the impacting pipe need not be assumed to lose their integrity, <u>but this should be justified.</u>	Even if gross failure is unlikely, there may be local partial failures and there is no evidence on leak size. It is noted that the remainder of the paragraph expands on the same issue.		X Subject to justification, impacted target pipes of a diameter equal to or larger than the impacting pipe need not be assumed to lose their integrity.		Better wording
5	Korea	4	133	4.133	In some 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~~ such a low level that it can be effectively excluded from further consideration.	For editorial correction	X			
15	UNRC	4	144	4.144	Add, "**such as a malfunction of fire hydrant or a maloperation of fire hydrant**."	When an indoor fire hydrant is operated for maintenance, its valve may not be easily closed due to malfunctions.			X	Sorry, the comment is not clear with respect to the place where to add the proposed text as para. 4.144 is about operator actions. If the proposal is to be placed after maintenance activities, there is no need to put examples inside an example in this high level recommendation.

MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
8	UNRC	4	145	4.145	Add item or reorder list to include, "**Non-safety piping systems such as domestic water, circulating water, condensate, radwaste, external backwater through drains, etc.**"	The list was not inclusive of traditionally non-safety related piping systems which could result in large volumes of water and inundation. For example, there is a potential backwater effect of external flood. Through the drains, the backwater may inundate the building inside.		X A leak in piping systems such as domestic water, circulating water, condensate, external backwater through drains.		Non-safety is not clear. is it 'not important to safety'? Hopefully radwaste piping systems are important to safety.
17	UNRC	4	146	4.146	Suggest adding: This identification should be supported by "**design drawings and**" room walk-downs for verification. **"An appropriate model (e.g., three-dimensional model)"** could also be used for verification and validation purposes.	3D models are not the only models which could be helpful and should be considered.	X for design drawings		X	The fact that 3D models are not the only models is expressed with 'could also be used'
9	UNRC	4	147	4.147	Add, "**Appropriate critical flood heights should be determined for each compartment flood scenario. The equipment impacted could be significant from either a risk analysis or deterministic one**."	This is instrumental in determining mitigation and engineering of water egress features such as sumps, sump pumps, flapper doors, and drains.			X	Critical flood heights not clear. Is it maximum flood height? Added value of this proposal?
18	UNRC	4	148	4.148	Suggest adding: …if they are not designed to withstand the hydrostatic pressure "**and/or hydrodynamic loads that occur."**	Edit clarifies that pressure and resulting load should be considered.		X if they are not designed to withstand the hydrostatic pressure and/or hydrodynamic loads that might occur.		Better formulation as hydrodynamic loads might or might not occur.
19	UNRC	4	161	4.161	Suggest adding: (a) Appropriate design (e.g. "**passive flood protection features,"** isolation valves on drains, pumps and water-tight doors, and on potentially hazardous pipes); (b) Detection systems (e.g. flood alarms); (c) Adequate procedures **("e.g.,"** operational and/or emergency procedures).	Addition of consideration of passive flood protection features as part of appropriate design.	X			
20	UNRC	4	164	4.164	Clarity: Additions edited as follows. The possible formation and effect of internal flood waves should be taken into account and analysed, if flooding is fast enough (such as in the event of a total breach of a large tank). A wave could increase the local water level significantly above the "**estimated steady state water levels"** and therefore, a dynamic analysis should be performed **"to estimate the effects of the waves on SSCs important to safety".** This evaluation should also evaluate the mechanical loads imposed on SSCs by waves **"and the potential effects of floating debris on SSCs."**	Added text clarifies importance of consideration of wave effects and floating debris.		X The possible formation and effect of internal flood waves should be taken into account and analysed, if flooding is fast enough (such as in the event of a total breach of a large tank). A wave could increase the local water level significantly above the estimated steady state water level and therefore, a dynamic analysis should be performed. This evaluation should evaluate the mechanical loads imposed on SSCs by waves and the potential effects of floating debris on SSCs.		Better formulation as it avoids repeating effects of waves on SSCs important to safety.

MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
10	UNRC	4	165	4.165	Add to the following: "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. **Care should be taken in design to make portions of redundant drainage independent and not drain into common headers.** Administrative controls should be used to ensure that temporary equipment that could clog drains (e.g. plastic sheeting) is not stored in a location in which it could be transported to drains if a flood were to occur.	Avoid situations where a critical room has adequate draining and check valves but, all drain into a common header which could clog rendering the entire system unavailable.		X Portions of redundant drainage should be independent and not drain into common headers.		More concise formulation.
16	UNRC	4	168	4.168	Suggest adding, "**If below-grade protections of safety related SSCs rely on permanent dewatering system, an indoor flood protection for the SSCs needs to be designed and installed, such as portable pumps or temporary barriers.'**	When the dewatering system fails, the SSCs will need a temporary flooding protection as a backup.			X	The terminology 'Below-grade', 'safety related' is not not clear.
21	UNRC	4	168	4.168	The design of the plant should ensure that potentially contaminated water released during **"an internal flooding event"** does not propagate into the "**site surface and/or ground water".** One method of achieving this is to ensure that those portions of the building that are below the assumed maximum flood level are leaktight.	Clarification added to ensure surface and groundwater contamination is considered.	X		X	Internal is not necessary as we are under the heading 'Mitigation of internal flooding and the effects of internal flooding'
11	UNRC	4	176	4.176	Add to the following: Functional design requirements often govern the physical location of equipment in this category. Where it is functionally necessary to tolerate proximity between heavy equipment and critical targets, it is possible to provide sufficient design measures such as redundant cables on cranes or interlocks to reduce the probability of failure. **A crane risk analysis should be performed to identify potential vulnerabilities in its design and operation.** Guidance on the design of high integrity and single-failure proof cranes is available in Refs [16–19].	This will help in developing a risk profile of heavy lifts in the plant and guide Operations staff in making maintenance and operational decisions.			X	The proposal is covered in the following paras, in particular 4.178.

MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
12	UNRC	4	181	4.181	Add to the following: A significant mitigation of risks from dropped 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. "**Load drop contingencies should also be adopted and used in scheduling considerations**"	Load drop mitigation systems should be identified and ensured to be available during the heavy lift evolution and not scheduled for concurrent testing or maintenance.			X	Given the "high level" nature of the discussions in this section entitled "Mitigation of the effects of heavy load drop", and the aspects already covered in paras 4.182 and 4.183, the proposal is adding confusion rather than giving more clarity.
13	UNRC	4	187	4.187	Add to the following: The potential sources of electromagnetic interference should be identified and possible effects from them should be assessed. Significant sources of electromagnetic interference within the control of the operating organisation include motor and generator brush assemblies, and fault current clearance from the operation of switchgears, circuit breakers or fuses; **flash photography;** there can also be electric fields caused by radio transmitters. There is considerable operating experience feedback available that will help designers identify potential electromagnetic interference mechanisms. Further recommendations are provided in SSG-39 [6].	Flash photography has become a trip hazard on certain panels containing sensitive electronic devices such as with turbine control systems. Some plants in the US either ban or limit the use of flash photography on open panels while a unit is operating.		X The potential sources of electromagnetic interference should be identified and possible effects from them should be assessed. Significant sources of electromagnetic interference within the control of the operating organization include motor and generator brush assemblies, and fault current clearance from the operation of switchgears, circuit breakers or fuses; there can also be electric fields caused by radio transmitters. Even flash photography has occasionally affected sensitive control and protection equipment. There is considerable operating experience feedback available that will help designers identify potential electromagnetic interference mechanisms or similar faults. Further recommendations are provided in SSG-39 [6].		More clear formulation
23	UNRC	Fig 1	Fig 1	Fig 1	Clarification is needed on the center portion of Figure 1.	The meaning of the dotted line and the word "No" in Figure 1 are unclear. If the word "No" means that the fire containment approach was not able to demonstrate that the safety objectives were met, a "Yes" box would seem necessary to demonstrate whenever the safety objectives were met. In addition, if the fire safety objectives are met, why would it be necessary to "further divide into fire cells"?				The 'no' means that the demonstration that the safety objectives are not met. By the way, this 'no' was requested by USA in its comments of May 2018. Figure 1 is from NS-G-1.7 and is adapted to take into account Member States' comments.
22	UNRC	General	General	General	Provide definition section or point to a definitions document.	Please provide definitions for the usage of words such as segregation, separation, fire compartment and fire cell.				Fire compartment and fire cell are defined in paras II.13 and II.17 respectively. Segregation and separation have the usual meaning and need not be defined.
16	Germany	II	3	II 3	Simultaneous unrelated fires occurring in different fire compartments, in particular, if occurring at site with more than one reactor unit ~~multiple unit site~~ need not be considered in the design of fire protection means; however, the possibility of a fire spreading from one unit to another unit or to another installation on the site, should be taken into account in the fire hazard analysis.	Clarification; this covers multi-unit sites, multi-sources sites including research reactors at a NPP site.			X	'multiple unit site' is the terminology used in IAEA documents, in particular SSR-2/1 (Rev.1).

MS No.	Member State	Sec.	Paragraph	Original	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
17	Germany	II	4	II 4	The fire hazard analysis should have the following purposes: (a) To identify the type and amount, as well as the location and distribution, of fire loads (permanent and temporary ones ~~fixed and transient~~) and potential ignition sources over the room or plant area.	Clarification, see comment to para 4.5			X	See resolution of comment No. 7
14	UNRC	II	8	II 8	II.8. The overall purpose of fire barriers in nuclear power plants is to provide a ~~**passive**~~ boundary around a space (e.g. a fire compartment) with a demonstrated capability to withstand and contain an expected fire without allowing the fire to propagate across to, or otherwise cause direct or indirect damage to, materials or items on the side of the fire barrier not exposed to the fire.	Not all barriers are passive. There are active detector-actuated doors, dampers, and water curtains which act as fire barriers in plants.	X			
18	Germany	II	9	II 9	… The absence of relevant emissions of flammable gases from the face unexposed to the fire should also be verified.	Many fire barriers by design are not gas tight so that small amounts of flammable CO etc. may get through a barrier during fire. Practically it is covered by rating criteria.	X			
19	Germany	II	21	II 21	Where separation by distance is the sole means of protection between fire cells, the fire hazard analysis should demonstrate that neither radiative nor convective heat transfer effects nor by fire by-products would jeopardize the separation.	Distance does no stop smoke movement. Effects by smoke products (soot, irritants) should be considered, compare II.14 of step 11 document.		X Where separation by distance is the sole means of protection between fire cells, the fire hazard analysis should demonstrate that neither radiative nor convective heat transfer effects nor fire by-products would jeopardize the separation.		Better formulation.
20	Germany	II	46	II 46	… Automatic sprinklers, water mist systems, water spray ~~or spray water deluge~~ systems as well as …	"Spray water deluge system" is a subtype of "water spray system"		X Automatic sprinklers, water mist systems, water spray and deluge systems as well as ….		More clear formulation, consistent with NS-G-1.7.
2	Korea	References	References	References	**[24] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Commissioning and Operation, IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), IAEA, Vienna (2016).**	See comment on Para 2.13 (Add the reference [24])			X	See resolution of Korea comment No. 1.
16	ONR/UK									