DS 481, step 8: Design of the Reactor Coolant System and Associated Systems in Nuclear Power Plants

COMMENTS BY REVIEWER Reviewer: Pieter De Gelder Page.... of.... Country/Organization: Belgium/Bel V Date: 10/03/2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	2.1	"…mitigate the consequences of design extension conditions to the extent <u>possible</u>;"	Word seems to be missing				
2.	Text before 3.11	"…the requirement 5.16 <u>of [2]</u> specific to "Internal Hazards" ".	Add reference explicitly, to avoid confusion with 5.16 of DS481.	X			See 3.13
3.	3.12	"…to ensure that the ~~modelling~~ <u>operability</u> of the system response described in the analysis is not compromised …"	Not the modeling is the concern, but the operability	X			See 3.15
4.	3.30	"Design basis accident (DBA) conditions should be identified and calculated for the <u>RCS and</u> each of the associated systems."	Why is 3.30 limited to the "associated systems" while 3.31 applies to RCSASs (thus including the RCS)? Therefore proposal to add RCS in 3.30	X			See 3.34
5.	3.34	To be reformulated?	We do not understand how calculations for equipment can be compared with calculations for accidents.	X			See 3.41

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			The objective of this § 3.34 is not clear.				
6.	3.33 and 3.36	Change order. § 3.33 would be better moved after 3.36	3.36 gives general types of DEC. 3.33 gives more specific examples. Therefore 3.33 fits better after 3.36 (or even after 3.37)		X		Moved to 3.40
7.	3.42	Last sentence to be replaced by something as "If duly justified, some types of passive component failures need not be postulated as passive single failure."	The present last sentence is too short. It might be interpreted that a passive failure has not to be postulated at all. In the long term, it always has to be considered, but some failure modes can be exempted.	X			See 3.49
8.	3.92, 3.95 and 5.87	Remove underlining in the text		X			See 3.110
9.	3.104	Delete 3.104	It is redundant to the 4th bullet of 3.92. Moreover, the objective of having	X			

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			such samples is not radiation protection (as suggested by title above 3.104) but follow-up of material properties.				
10.	3.107	Should be deleted or further specified.	The present sentence is too general. Where to install such measurement? Only one? In each system where gases can accumulate?	X			Deleted, See 3.126
11.	3.110	In the title and in 3.110 it is better to replace "interface" by "isolation" (3 times)	The objective of this § is to foresee adequate isolation, not interface.		X, done in the text		Titlle of next para. Contains "Isolation"
12.	3.118	Modify as follows: "According to the overarching requirement 33 of [2] each unit is required to have its own safety systems <u>for DBA</u> and its own safety features for design extension conditions."	For clarity.			X	Exact quotation of Requirement 33
13.	4.4, second bullet (and 5.58)	Modify as follows :"… to ~~operate~~ <u>bring</u> reactors to the safe shutdown state …"	More adequate wording	X			See 4.6
14.	4.5	"To fulfil the design objectives in terms of capacity and reliability and	We find the present article too weak,		"May"		See 4.7

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		to comply with the Defence in depth concept (Requirement 53, item 6.19A), an alternate UHS shall be foreseen, which is diverse from the normal UHS."	especially the wording "might".				Requirement 53, item 6.19A is written with "may".
15.	4.17	To be reworded	Present sentence is wrongly structured or incomplete.	X			See 4.19
16.	4.20	To be reformulated.	Present wording, especially "multiple means", is too vague. Should the means just be redundant? Or should they be diverse?			X	See 4.23 "multiple means" is used on purpose in order not to be design dependent and is the wording used in SSR-2/1 Req. 7 bullet f)
17.	4.24; 4th bullet	We propose to delete "(or more for systems with more safety valves)"	This text in parentheses seems to indicate that a design with more safety valves has to penalize itself by postulating more failures. Is that really the objective of the authors?			X	Yes considering more than one failure is the practice of some MS where the number of safety valves is larger
18.	5.59	Replace "may" by "should " (or even "shall")	"May " seems too weak	X			See 5.67 "should"

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19.	5.64	Modify as follows: "The vessel ~~wall~~ should be …"	Not only the "wall"; also bottom and vessel head. Therefore "the vessel".	X			See 5.77
20.	5.101	Replace by "Main feed water <u>injection</u> ~~lines~~ should be automatically <u>stopped</u> ~~closed~~ after a reactor trip in order to prevent an excessive cooling of the core."	Closing the lines might block the flow from the "Startup and shutdown feedwater system"	X			See 6.14
21.	Text before 5.113	Modify as follows "In ~~cold~~ shut-down mode of normal operation, …"	Scope of 5.113 is wider than cold shutdown alone.			X	See 6.27 With the parenthesis it seems like correct
22.	5.124	Modify as follows " …~~clear~~ <u>non-borated</u> water …"	More appropriate wording		"unborated water"		See 6.38
23.	5.127	With the present wording, it means that for features foreseen for DEC also the single failure criterion (see 3.42) has to be applied. Is that the objective?			"…designed to mitigate the consequences of DBAs or to DEC respectively…"		See 6.43 No it is not. Systems for DBA conditions should be designed according to the general design recommendations given for DBAs and the safety

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							features for DECs should be designed according to the general design recommendations given for DBAs
24.	5.128	In view of the comment above, is this reference to adequate reliability not enough? (so that the requirement for applying the single failure criterion (cf 5.127) is no more needed)					Reliability of DECs features designed to cope with DEC wo significant core damage may not be same for all, it depends on the frequency of occurrence of DEC sequence
25.	Text before 5.131	Modify as follows: "~~This system~~ <u>The ECCS</u> also performs some functions …"	Because other systems (EFWS) are mentioned in the text above.	X			See 6.47
26.	Text before 5.131, footnote 8	If [15] (DS 482) gives specifications on the sump, we propose to reword the footnote as follows "Specifications concerning the sump filtration system are given in …."	It is strange that in this SG the sump is considered not part of the ECCS, while it would be part in other SG. Further 5.146 and 5.147 give specifications for the sump.	X			5.146 and 5.147 give recommendations for the design of the ECCS pumps nor for the sump. (foot note 10)
27.	5.135	The emergency <u>core</u> cooling system	Word is missing	X			See 6.54

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		…"					
28.	5.141	Modify as follows "…(e.g. check valves are widely used ~~by Member States~~)…"	It is in fact the designer that makes this choice.	X			See 6.60
29.	5.142	Modify as follows: "ECCS equipment should be located outside the containment to the extent <u>needed</u> ~~possible~~ in order to …"	For limiting radiological consequences (in case of leaks) it might be favorable to have large parts of the ECCS <u>inside</u> the containment.			X	See 6.61 For the purpose of qualification, maintenance, periodic testing, etc ECCS equipment except piping and isolating devices should be outside the containment
30.	5.145	"For accident management, actuation<u>,</u> ~~and~~ shut-down <u>and isolation</u> of every ECCS train should be possible from the MCR. …"	Add isolation, to allow for repair in case of failure	X			See 6.64
31.	Text before 5.159	Modify as follows: "Such a system ~~train~~ includes several redundant trains, …"	It is the system that includes redundant trains	X			See 6.81
32.	5.165	Modify as follows "For the practical elimination of the phenomena associated with the high pressure melt ejection in case of severe accidents (Direct Containment	Word "shall" (or "should") is missing	X			See 6.91

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		Heating), the design shall include a fast depressurization of the primary circuit …"					

Canada

COMMENTS BY REVIEWER Reviewer: N.Shykinov and … Country/Organization: Canada / Canadian Nuclear Safety Commission and Canadian nuclear industry Date: May 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1		General	1. Suggest discussing and editing sections 5, 6, 7 for more consistent writing style and technical requirements. • Different terminology is used (e.g. safety features for DEC and complementary design features). • The same requirements could be applicable for PWR and HWPR but not included in the text (e.g. leak before break, 5.85 should be moved to section 3). • For example, the				

			following requirements are applicable for any design: *7.104 The SDCS should preferably be located inside the containment.* 2. It looks like ATWS means the shutdown by rods only. However injection of boron acid from feed & bleed or ECC is a second shutdown system and cannot be excluded from ATWS. Suggest clarifying this in foot note or special clause. 3. New proposed designs with integral scheme (everything is inside of reactor vessel) should be clearly included or excluded in the document. If it will be included separate sections, it should be added (similar to sections for PWR, BWR and HPWR)				
2	2.4	For indirect cycle reactors, i.e. PWRs, the pressure retaining	Suggest discussing if the reactor vessel, supports,			X	RPV internals, I&C supports are not

		boundary of the RCS includes the **RPV with internals, primary side of the steam generators (see section 5), related I&C including regulators, supports and support structures, and installed equipment such as valves and pumps**. For direct cycle reactors, i.e. BWRs, the pressure retaining boundary of the RCS also includes the primary coolant recirculation system and the steam and feed water lines up to and including the outermost containment. **For designs with integral scheme, (everything is inside of RPV) the RCS boundary shall include all pipes from RPV to the first isolation valve (including this valve).**	containing structures and I&C (including regulators) are included in RCS. In addition, discuss a case for integral reactors (e.g. some SMRs)				included in the definition of the RCPB
3	3.2	The design of RCSASs should be conducted taking into account design recommendations for safety **and security** in an integrated manner in such way that safety and security measures do not compromise each other. Recommendations for security are detailed in [4].	It is not clear what security measures are for the RCS. Is it structures, cyber security, etc.? If so, suggest adding a foot note with clarification			X	Design provisions implemented for security cannot be addressed in this Safety Guide. This recommendation is a generic recommendation to be inserted in the SGs
4	3.6	A design basis should be defined for every structure, system and component and should specify the following: **….**	Suggest adding a bullet			X	The clogging of the sump filters is addressed in the Safety Guide DS482 (revision of

		– loss of flow (e.g. blockage under LOCA due to insulation)					NS-G- 1.10 "design of the containment"
5	3.97	All pressure retaining components of the RCSASs should be protected against overpressure conditions generated by component failures or by abnormal operations in order to observe the pressure limits, in compliance with applicable proven codes and standards. **Release of the PRV should be designed to prevent primary coolant leaks outside of the containment and, as practicable, into containment atmosphere.**	Current good practice		**Release of the PRV should be designed to prevent primary coolant leaks outside of the containment**		To be moved in Section 5 (it applies to the 3 reactor technologies
6	5.165	For the practical elimination of the phenomena associated with the high pressure melt ejection in case of severe accidents (Direct Containment Heating), the design include a fast depressurization of the primary circuit that should be used before the onset of a core melting accident. **Release from depressurization points should be designed to prevent leakage outside of the containment and as practicable, into containment atmosphere.**	Current good practice and Fukushima lessons learned.				See comment above
7	3.99	The design layout of the RCSASs should take into account: **• Location inside containment boundary** • Radiological protection of site	Missing requirements				

		personnel; • Protection against the consequences of pipe failure (depressurization wave, pipe whip, flooding, high pressure jet); **• Protection against internal and external hazards;** **• Excluding of additional loads due to interaction with other systems and structures due to changing dimensions (e.g. thermal expansion)**					
8	3.67 & 5.7	3.67 The design basis of each component of the RCSASs should include, for each plant state **and life stage**, the loads and load combinations that components must withstand. 5.7 The cyclic plant conditions that may cause the apparition of cracks due to fatigue should be identified at the design stage in order to be monitored during the plant operation, and a number of occurrences should be assigned to each of them in respect of the usage factor.	Suggest include 5.7 in section 3 because it is applicable for all designs. Also, safety limits could be different for a different life time due to *a number of occurrences* which RCS has withstood.	X			Modified as follows; "for each plant state **and service conditions"** Recommendation 5.7 cannot be moved in section 3 because it applies to RCS only
9	4.4	Short and long term capacity of the UHS should be preferably achieved by the use of the atmosphere or inexhaustible natural bodies of water. Where access to an inexhaustible supply of water at the site is not available:	External hazards like tornado and a seismic hazard could "suck" water from pool, or the water could freeze.	X			

		• UHS capacity should be ensured by an adequate amount of water always available at the site. This capacity should be adequate to absorb all heat loads generated at the site until the heat sink can be replenished In such a demonstration account should be taken of factors that could delay the replenishment process. Such factors include evaporation, human induced events, **external hazards such as tornado or low temperatures**, plant accident conditions, availability of interconnections and the complexity of the procedures for replenishment.					
10	5.3	The following types of failure modes should be considered in the design according to the relevant code requirements and limits: … • **erosion,** • **corrosion (all types),** • **thermal shock (e.g. due to ECC work which could led brittle fracture issue)**	Missing requirements				
11	5.20	The pressure control system of the RCS should be designed to maintain the pressure within the limits **(both high and low)** ensuring the cooling of the fuel in operational states as	Protection from low pressure is needed due to possible boiling and following flow stagnation			X	"Within" is correct

		long as two-phase conditions are maintained in the pressurizer.					
12	5.33	Spurious opening **or not closing** of a safety valve should be prevented and its frequency should not be higher than the frequency considered for loss of coolant accidents.	A valve that is not completely closed is equal to a small/medium LOCA.			X	No consensus between MS on this point
13	6.26	Flow restrictors should be included in the main steam lines to limit the rate of loss of coolant following a main steam line break inside or outside the containment for ensuring that the core remains fully covered by water before the closing of the MSIVs. **Note: MSLB or feedwater pipe rupture inside containment could lead to the dissolving of borated water in the sump. It should be accounted in design**	Decreasing concentration of boron acid in the water stored in the sump should initiate additional activity for restoring the concentration.				Correct. Should be indicated in the justification of the boundary conditions taken for the relevant analyses (LOCA, MSLB, MFLB)
14	7.13	The fuel channel design should permit continuous gas flow in the annulus between the pressure tube and the calandria tube to allow leak before break detection, **and prevent PT and CT contact**	Contact of PT and CT would increase a probability of in-core LOCA				
15	7.54 & 7.83	7.54 If the pressurizer can be isolated from the RCS in certain operating conditions (i.e. during warm-up or cool-down), the pressure and inventory control system should include alternative means of controlling the pressure and inventory in the RCS, such as a	In the case of a LOCA, the intact loop should be isolated from damaged loop and pressurizer. The intact loop will be “solid”. Crash cooldown shall not damage the intact loop.				

		set of automatically controlled feed and bleed valves. In this case, the pressurizer should have an independent safety and/or relief devices. **Design has to prevent water hammer in the intact loop during crash cooldown with the pressurizer isolated.** 7.83 A crash cool-down or an RCS depressurization should not result in any reactivity or structural concerns.					
16	2.1	Maintain sufficient coolant inventory and cooling conditions to prevent significant fuel damage in design basis accidents and to mitigate the consequences of design extension conditions to the extent practicable.	Adding the word practicable enables a graded approach	X			
17	3	Add to list: Human factors process and considerations contributing to effectiveness.	While other statements in the document outline that detailed design issues associated with equipment are not included, a high-level statement is required regarding expectations that human factors which can contribute to effectiveness should be addressed in an integrated manner during all phases of the system(s) life cycles.				Human factors are detailed in xxx
18	General	Clarify.	The wording around DEC			X	Definition of DEC

			and Design Bases needs to be clarified throughout the document. In many cases, it is unclear how the DEC is to be treated differently from the Design Base conditions.				is given in SSR2/1 Rev1.
19	3.23	Clarify the clause, "In the event of external hazards, short term actions necessary to preserve the reactor coolant pressure boundary (RCPB) integrity and to prevent conditions from escalating to core melting conditions should be accomplished by systems available at the site (Requirement 5.17 of [2])."	Is this referring to beyond design basis or within design basis?				It applies to postulated conditions in the event of ext hazards considered for design
20	3.24	Clarify the clause, "Capability for adequate core cooling should be longer than time necessary prior to crediting off-site support services."	Is this referring to beyond design basis or within design basis?	X			Modified to be clearer
21	3.27	Add requirement for codes to be developed/modified to maximize usability and correct human performance.	Usability of codes can and do impact the likelihood they will be used correctly, and can be used effectively.			X	See 3.30 (new numbering)
22	3.31	performances, and the single failure which has the largest impact on the performance of	typo	X			
23	3.31	Clarify.	As currently written, the intended requirement is not clearly expressed.				The recommendation looks like clear
24	3.33	Clarify the clause, "Design extension conditions without significant fuel degradation should be identified and used to establish	Unclear what is trying to be stated in this statement. The linking of DECs to design bases is				Each component has its own design basis.

		the design bases of systems necessary to prevent postulated sequences with multiple failures from escalating to core melting."	confusing.				The design basis of individual equipment should not confused with the "design basis of the plant"
25	3.33	Clarify whether DECs are to be used as part of the design basis of a system -- that's what makes them DECs.	Clarification.				For new plants DECs are part of the design envelope
26	3.35	DECs relevant for the design of additional safety features should be identified on the basis of engineering judgement as well as deterministic and probabilistic assessment.	The design of features to address DECs could result in DEC being thought of as Design Basis. Additional clarity is required.				Slightly modified
27	3.6	"The protection against" items listed in this clause should not be specified in the design basis.	The design basis should specify the things that the system needs to be protected from. Similarly, environmental conditions "for qualification" aren't design basis. The environmental conditions that the system needs to handle are. Also, selection of materials isn't design basis -- the factors that the materials need to perform in are.				Details to be addressed as part of the design basis are provided in the whole section3
28	3.38, 3.40, after 3.45	Add: "RCSASs should be designed in recognition of Human factors considerations contributing to effectiveness."	Industry does not see an up-front statement regarding the need to consider human factors				A general recommendation for human factors is added in the para.

			considerations/ impacts such a statement might remove the need to mention this throughout.				"Reliability"
29	Part of Defence in Depth, after 3.51	CCF should consider potential human errors.	For DECs, human actions often are relied upon for ensuring DEC-related systems are effective. This can affect minimum shift complement, which often is established for existing plants. While this document may be targeted for new plants, often the design basis is an existing, similar design (which existing min shift, procedures etc.) Will this document apply to modifications of existing systems? Will this document apply to modifications of existing systems? Will this document apply to modifications of existing systems? If this type of clause is not included, what drives the PSA (see 3.121 etc.) to include Human Errors for DECs?				CCF caused by human errors are primarily prevented by EOPs and operator training
30	Section 7 Page 78	The system referred to as the shut-down cooling system in the intro to Section 7, and later in this draft, is	Enhanced clarity.			X	The guidance of SDCS covers all residual heat

		known as the “maintenance cooling system” at utilities with a separate system called the shutdown cooling system. This system is used to cool the unit from the hot condition to cold, when maintenance cooling takes over. It would be good to note this distinction and consider whether requirements need to be added in the latter sections regarding systems used to lower the temperature of the RCS.					removal stages including maintenance.
31	Page 78	Insert a description of preheaters into Section 7.	Some utilities have preheaters as an additional major component in their heat transport systems, but they are not mentioned in Section 7 at all.			X	This Guide does not represent a guidance/recommendation for a special design. Regardless of separate or part of SG vessel, all primary systems and components are part of primary pressure boundary and should meet the guidance of RCS (HTS).
32	7.14	Replace the term “cover gas” with “annulus gas”.	Enhanced clarity since many utilities refer to the gas between the pressure tube and calandria tube as “annulus gas” as opposed to only “cover gas”.	X			
33	7.16	Amend to read, “The pressure boundary portions of fuel channels should be designed and	While the pressure boundary portions of fuel channels are designed and			X	This guidance is not only for pressure boundary.

		manufactured in accordance with established codes and standards taking into consideration available experience including operating experience."	manufactured to codes and standards, there are non-pressure boundary portion of the fuel channel (such as the shield plugs) that are not.				
34	7.17	Amend to "any welds" and clarify that this only applies to the PHT pressure boundary.	Enhanced clarity. There are no welds in the fuel channel's pressure boundary. It would be helpful to clarify that this only applies to the PHT pressure boundary because there are welds associated with the fuel channel that do not undergo through-wall examination, e.g. the bellows to bellows-attachment-ring weld.		Deleted		This guidance is originally from Clause 4.8 of the old guidance NS-G-1.9 but is replaced with Clause 3.111 (general design of RCS) of the new guide which captures its intent.
35	7.18	Amend to read, "representative rolled joints."	Enhanced clarity. The intent is not to pull-out test the actual rolled joints.		X Prototype rolled joints employed in RCS should be tested for pull-out strength.		As per N285.0-17, E.2.2.2: For mechanical joints made by roll expansion, the load required to pull the pressure tube out of the end fitting shall be measured on at least four prototype joints. This pullout load shall exceed three times the design condition axial load,

							including pressure, when the test is performed at design temperature, or four times if the test is performed at ambient conditions
36	7.25	General comment - While inspection of steam separators may be a good idea from an equipment performance perspective, steam separator degradation doesn't affect PHT integrity or performance	Not 7.25 but 7. 26			X	5.26 is now 5.112 Inspection of the separators is a good practice. Undetected defects or cracks could later on affect the integrity of the SG tubes
37	7.27	It should be clarified that everything in this requirement is about the secondary side. Also, why is the ability to drain required? That is only needed for maintenance and different steam generator designs can drain to different extents without pulling a tube.	Enhanced clarity				Draining is deleted from the list
38	7.31	Suggest changing to, "Blow down should provide a method of controlling concentration of dissolved species that could come out of solution and accumulate as solid particulates."	Blow down does not directly address accumulation of solid particulates. Rather blow down provides a method of diluting dissolved species in the steam generator secondary side.		X The design should include blow-down provisions to remove the amount of solids (sludge) that could accumulate in areas of stagnant flow.		
39	7.33	This clause needs additional explanation or the removal of some	Enhanced clarity		X See 5.114-5.116		

		bullet points. The opening sentence says, "the following safety parameters" even though some of the bullets are not truly "safety parameters." Some aren't parameters (e.g., provisions), and for some others their safety implication is not clear.					
40	7.33	Amend to say the divider plate should only need to withstand a LOCA to the extent that the safety requirements are met. If some amount of leakage is introduced, it may be acceptable.	Clarification				Wrong number
41	7.44	Amend to note that stress corrosion cracking isn't just a risk at dis-similar metal welds. Materials should be selected that resist SCC at any place where the requisite stress and environment can exist (e.g. top-of-tube sheet in the steam generators).	Enhanced clarity		X See 5.117-5.118		
42	Page 83	Somewhere toward the bottom of page 83 it appears the requirements switch from being specific to the steam generators to being general RCS requirements.	Clarification	X			Recommendation relevant for piping and layout have been moved
43	7.66	i. Clarify whether this requirement was only supposed to apply to the pressure or inventory control system or if it's generic to the RCS. ii. Non pressure retaining equipment should be at least seismic category 2.	i. Clarification ii. It is inappropriate to say that anything that's non-pressure boundary can be category 2. There are some non-pressure boundary items in the RCS that need to be				Deleted

			category 1 because they serve an important safety function. An example is the liners and shield plugs in the fuel channels, where the PHT flow path needs to be in place during and following a seismic event.				
44	7.84	Delete.	This is just a description of liquid zone control and doesn't appear to include any guidance.	X			Deleted
45	7.86	Amend clause to recognize that the discharge part of this clause doesn't work for a unit with separate preheaters.	Clarity.		X "The feed water system should take hot, pressurized feed water from the feed water train in the turbine building and supply it to the steam generator secondary side."		
46	7.91	Amend clause to state that the safety class of the piping connected to the steam generator should be based on consequence of failure relative to the safety functions.	It seems excessive to assign the safety class of the steam generator to the isolation points.			X	This guidance is applicable to the steam line from SG up to isolation valve, is primarily for new build, and also consistent with CSA N285.0.

ENISS

COMMENTS BY REVIEWER		RESOLUTION
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Country/Organization: ENISS	Date: 16 05 2017	

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1	2.2	For all reactor types, the RCS includes the components ~~necessary to provide and maintain the adequate core cooling conditions for the fuel in operational states (pressure, temperature, and coolant inventory and coolant flow rate).~~ associated with the flow of primary coolant (for instance for RWRs this includes coolant pumps, reactor vessel, pressurizer, steam generators and associated piping and valves). However fuel elements and control rods for controlling the core reactivity and shutting down the reactor are not addressed in this Safety Guide but in Ref. [2]. The RCSAS includes the components necessary to provide and maintain the adequate core cooling conditions for the fuel in operational states	The definition of RCS in 2.2 is wider than the definition normally applied for RCS (e.g. in the previous Guide NS-G-1.9). As presently stated, the RCS also includes, for example, the CVCS, RHRS and any other system that is required to provide and maintain adequate core cooling. Neither does the definition correspond to the figures in Annex 1, 2, and 3. The definition of RCS and RCSAS is not clear. In the previous Guide NS-G-1.9, the terms were clearly defined in Annex I and II. Please provide a clear definition of RCS and RCSAS including a list of components. Strictly speaking, the RCS includes only those components associated with the flow of the primary coolant, i.e., coolant pumps, pressurizer, reactor vessel, steam generators		X		RCPB can be defined, but SSCs included in the RCS are largely design dependent. However the control of the coolant inventory has been removed, taking into account that this function is addressed as an associated system. See 5.1 for the RCS and 5.42 for the RCPB

			and associated piping and valves.				
2	3.11	Items important to safety for a safe shutdown of the reactor and for the mitigation of the accident conditions should be protected against the effects of internal hazards, either at the origin of the accident, or occurring independently during the safe shutdown of the plant**.** That protection should also consider the consequences of the failures of items non-protected.	The requirements for protecting item against the effect of internal hazards should depend on the accident conditions whether they are caused by the internal hazards or not.			X	See 3.14 Even if an internal hazard does not lead to some accident conditions, the systems for the mitigation of DBAs and DECs are required to be protected.
3	3.31	…, and the single failure which has the largest impact on the performance of the safety systems	Typing error	X			See 3.35
4	3.34	Calculations performed to specify the design bases of RCSASs equipment may be less conservative than those used for design basis accidents provided that margins are still sufficient to cover uncertainties. Evaluation of DEC could use best-estimate considerations for determining accident scenario and design conditions of equipment for DEC. Performing sensitivity analyses could also be useful to identify which key parameters present uncertainties to be considered in design.	The Guide ought to provide more details regarding the analysis of DEC for RCSAS's equipment, e.g., that best estimate analyses are indeed qualified to provide design specifications for DEC.			X	The requested addition is not necessary. Para. 3.37 and 3.42 (new numbering) provide recommendations to identify DEC scenarios and recommendations for the design of RCSASs (to define and establish the design bases of the various SSCs).
5	3.42	Systems operated to maintain the reactor in a safe state in the long term should be designed to	See SSR2/1 para5.40 for passive single failure		X		See 3.49 Modification made to match similar

		accomplish their function despite a single failure postulated in any of those systems. A failure of a passive component might not be considered if ~~justified~~ it has been demonstrated with a high level of confidence that occurrence of such failure is very unlikely.					comments
6	3.49	The following recommendations should be applied….	The content of the term "similar" is unclear, as in "Similar recommendations as indicated for systems designed to mitigate design basis accidents should be applied…" Please be more specific.	X	~~Similar~~		
7	References	Consider renumbering the references	There is no [6] document.	X			

Finland

COMMENTS BY REVIEWER Reviewer: M-L. Järvinen Page.... of.... Country/Organization: Date:				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
	2.1	.. □ Maintain sufficient coolant inventory and cooling conditions to prevent significant fuel damage in design basis accidents and to mitigate the consequences of design extension	delete to the extent, not needed		X" …and to mitigate the consequences of design extension Conditions without significant core damage		RCSASs are not designed to mitigate the consequences of accident with core melting

		conditions ~~to the extent~~; …					
	5.46	Failures of any component or system and operator errors whose consequences would modify RCS conditions or loads defined for normal operation should be identified and primarily categorized in a plant state category on the basis of its frequency to occur (see paragraph ~~3.4~~ 2.1).	Please check the referenced paragraph, should be 2.1. Item 3.4 here is an excessive transmission link.		Item 3.8		
	5.94	The CVCS should be designed to adjust RCS boric acid concentration in order to control core axial off set together with the control rods during power operation.	Please add: set together with the control rods Core axial offset is controlled first of all by means of the control rods.			X	Control rods move up or down to control RCS average temperature but can distort the core axial off set. In such conditions a RCS borication or dilution is needed to recover a correct core axial off set
	5.137	The emergency core cooling system injection capacity should prevent boron crystallization in the reactor or spent fuel pool (SFP), which can leads to the fuel melting due to a heat removal violation.	Please replace crystallization in core by crystallization in the reactor or spent fuel pool (SFP), which can leads to the fuel melting due to a heat removal violation. This is more general formulation because the boron crystallization is			X	Relevant for DS 487 “Design of the spent fuel storage and fuel handling”, not for DS 481

			dangerous not only in the core but for example before the core entrance and in SFP in the case of long term boiling.				
	5.152	Steam dump to atmosphere system should discharge steam from the steam generator in order to remove residual heat and cool down the RCS in plant condition ~~where~~ provided that the condenser is not available or the main steam isolation valves are closed	clarity		”when”		
	5.158	Isolation of main steam relief ~~steam relief~~ valves of the affected SG should be performed in case of SGTR in order to limit release to the environment.	typo	X			
	5.98	Residual heat removal capabilities should be designed to cool down RCS from hot shutdown conditions to primary pressure and temperature compatible with the operation of the ~~Reactor~~ Residual Heat Removal System (RHRS).	typo	X			
	7.90	Main steam isolation valves (MSIVs) should be provided to ~~isolate~~ stop the main steam supply to the turbine in the event of steam generators tubes leak, after the reactor is shut-down, the SDCS is placed in service and the primary heat transport system is	clarity Please add: “MSIVs of the damaged SG should be also automatically closed at the accident MSLB (Main			X	For PHWR MSIVs should be closed to reduce a radioactive release due to SGTR but normally manual operation long after the event. Reactivity insertion is

		depressurized. : "MSIVs of the damaged SG should be also automatically closed at the accident MSLB (Main Steam Line Break) to limit the deep cooling of secondary and primary coolants and thereby to decrease the reactivity insertion. The RCP on the MCP (Main Circulation Pipeline) with damaged SG also should be automatically tripped for the same purpose".	Steam Line Break) to limit the deep cooling of secondary and primary coolants and thereby to decrease the reactivity insertion. The RCP on the MCP (Main Circulation Pipeline) with damaged SG also should be automatically tripped for the same purpose". It is important for mitigation of MSLB course in PWRs/WWERs.				not the issue
	7.127	The emergency core cooling system injection capacity should ensure core re flooding in case of design basis LOCA, according to the applicable acceptance criteria (e.g.: maximum fuel ~~sheath~~ cladding temperature).	terminology, fuel cladding not sheath	X			The parenthesis is deleted
	List of ab-breviations	Add RCP, SG, SGTR	Presence in text but absence in abbreviations.	X			

France

COMMENTS BY REVIEWER	RESOLUTION
Country/Organization: FRANCE Date: pages	

Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	General	There should be a verification that the differences between PWR, BWR and PHWR are relevant					
2.	3.31	~~Making assumptions too conservative could lead to the imposition of too high stresses on components and structures~~	It is under designer responsibility to choose adequate assumptions			X	See 3.35 Might be deleted But the two bullets are not expressed with "should' and therefore are not part of recommendations, but are typical examples of guidance which is also helpful in a Safety Guide
3.	3.41	Shutting down the reactor, cooling of the core, control of the core reactivity, residual heat removal and transfer to the ultimate heat sink in the event of design basis accidents should be possible despite the consequential failures caused by the postulated initiating event and a single failure postulated in any system needed to accomplish the function. Additionally, unavailability for maintenance or repair should be considered, when relevant.	It is under designer responsibility to take into account unavailability for maintenance or repair depending on his strategy regarding these activities			X	See 3.48 I agree and therefore the recommendation is just to be considered
4.	4.17	~~The heat rejected from items important to safety, operation of which is necessary to achieve and maintain safe plant shut down or to cope with post accident conditions.~~	The sentence is not completed. Thus it provides no guidance: consider deletion or completion	X	Merged with 4.16		See 4.16
5.	4.41-4.42	Suppression of these paragraphs	Generic sentences applicable to all systems, not only to heat transfer systems.	X	See changes in 4.25 and 4.35		Deleted see 4.43
6.	5.36	A fast RCS depressurization system should be implemented to prevent direct containment heating loads associated with the high pressure melt ejection in case of severe accidents ~~caused by the RPV failure at high pressure~~.	The fast depressurization system is implemented for prevention of high pressure core melt not for prevention of RPV failure as an initating event (moreover : consistency with 5.166)		… X heating loads caused by the core melt ejection at high pressure.		See 6.91
7.	5.39	Isolation devices between RCPB and connected systems less safety classified should be designed to close quickly and reliably in order to limit the loss of primary coolant in the event of a piping failure affecting a connected system. ~~The loss of primary coolant caused by the failure of a connected piping should not necessitate the operation of safety systems.~~	If the failure is before the isolation devices, the operation of safety systems could be needed. It could be also the case in some operating conditions, for example, breaks on the RHRS in shutdown state.		RCPB Isolation devices should be designed to close quickly and reliably	X	See 5.44 If the failure is located upstream the isolation devices, it is a failure of the RCPB and not a failure of a connected piping

8.	5.166	RCS fast depressurization valves should be different and diverse from the safety valves designed for the RCS over pressure protection and <u>from valves designed to control or manage accident conditions without core melt.</u>	Independence between provisions designed when applying practical elimination approach (with core melt) and provision designed when considering accidents without core melt	X			See 6.92
9.	5.170 bis	RCS fast depressurization shall be possible in case of station black-out.	New paragraph – Fukushima Dai-ichi insights	X			See 6.97
10.	6.28	Adequate isolation should be provided at the interfaces between the RCS and connected systems operating at lower pressures to prevent the over pressurization of such systems and possible LOCA. In any case the possibility of a LOCA occurring in the lower pressure designed piping (Inter-Systems LOCA (ISLOCA)) should be "practically eliminated" if this accidental condition could lead to large early releases ~~to the extent practical. This is event is known as an Inter-Systems LOCA (ISLOCA).~~	The use of « eliminated to the extent of practicable » is confusing. To be consistent with SSR-2/1 consider use of "practically eliminated". Thus, this term is applicable only to conditions that could lead to large or early releases (SSR-2/1), so – case of bypass – it could only be early releases.		X		See 5.49
11.	6.58	Appropriate design and manufacturing provisions should be taken to justify the practical elimination of the RPV failure ~~in all conditions~~[13] ~~13: Does not apply to design adopting an ex vessel core retention strategy in the event of an accident with significant core degradation~~	The footnote is not needed because here the "RPV failure" to be practically eliminated is intended as the initiating event. If not enough clear, it can be specified. Moreover, even if an ex vessel core retention strategy is adopted, the RPV rupture <u>at high pressure</u> following an accident with significant core degradation has to be practically eliminated as well.		X		See modification 5.79

Germany

COMMENTS BY REVIEWER	RESOLUTION
Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Physikerbuero Bremen and GRS) Pages: 10 Country/Organization: **Germany** Date: 16.05.2017	

Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	1	2.6	Those systems are systems designed to compensate leakages and to control the reactor coolant inventory in operational states.	"Leaks" are usually attributed to DBAs, in operational conditions "leakages" occur. If this is accepted a systematic check of the whole text should be performed.	X			
1	2	3.3	• Prevention-respectively-practical elimination of early or large radioactive releases.	According to [2] 2.13 (4) "Event sequences that would lead to an early radioactive release or a large radioactive release are required to be 'practically eliminated'". DS481 uses the term "prevent". Consistent wordings should be used.	X			
1	3	3.22	RCSASs ultimately necessary to prevent ~~avoid r~~espectively to practically eliminate an early or a large radioactive release (if any) should be identified.	According to [2] 5.21A the term "prevent" is used for "natural hazards exceeding those considered for design". And see comment to para.3.3	X			
1	4	3.31	For the performances of the RCSASs, design basis accident conditions should be calculated taking into account the least favourable initial conditions and equipment performances, and the single failure which has the largest impact on the performance of the safety systems. Maintenance work	Maintenance during plant operation can lead to unavailability of a safety important train. This assumption can - together with the single failure - lead to an unavailability of more than one train.			X	See 3.41

COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Physikerbuero Bremen and GRS) Pages: 10 Country/Organization: **Germany** Date: 16.05.2017					RESOLUTION			
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			should be taken into consideration. Care should be taken…					
1	5	3.42	Systems operated to maintain the reactor in a safe state in the long term should be designed to accomplish their function despite a single failure postulated in any of those systems. Additionally, unavailability for maintenance or repair should be considered. A failure of a passive component might not be considered if justified.	Sentence added as it is included in para. 3.41.			X	See reason given for your comment 4 + modification implemented
2	6	3.68	Loading conditions, loads and stresses should be calculated applying adequate accepted methodologyies and rules to establish confidence in the robustness of the design. and mMargins to cover uncertainties and should avoid cliff edge effects. and cover the following uncertainties:	Clarification		X …robustness of the design, and to provide adequate margins to cover uncertainties and avoid cliff edge effects		
1	7	3.72	The appropriate stress levels to be met for integrity should be defined and be appropriate to each load combination with account taken of the load combination category.	Allowable stresses in mechanical design are defined with respect to failure modes. Failure modes are listed in		X		New 3.81 Parenthesis is kept

COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Physikerbuero Bremen and GRS) Pages: 10 Country/Organization: **Germany** Date: 16.05.2017					RESOLUTION			
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			The stress levels may be different for the different ~~types~~ modes of ~~damage~~ failure (~~e.g. by progressive deformation and fatigue or excessive deformation and plastic instability~~ see para. 5.3).	para. 5.3.				
1	8	3.78	…. Materials specified for the RCSASs should comply with the applicable provisions of the code used, including but not limited to the following properties and characteristics: • Resistance to heat loads; • Strength, creep and fatigue properties; • Corrosion and erosion related properties~~;~~, including ~~• R~~ resistance to stress corrosion cracking; • Resistance to effects of irradiation; • Resistance to thermal embrittlement; • Resistance to hydrogen embrittlement; • Ductility characteristics ~~(including crack growth rate)~~; • Fracture toughness ~~(brittle failure)~~ characteristics (including both brittle and ductile); • Ease of fabrication (including weldability);	Stress corrosion cracking is a form of corrosion; Crack growth rate is related to ductile fracture toughness properties	X			

COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Physikerbuero Bremen and GRS) Pages: 10 Country/Organization: **Germany** Date: 16.05.2017					RESOLUTION			
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			~~• Resistance to metal–water reactions;~~	Metal–water reactions are forms of corrosion; high-temperature oxidation of fuel cladding is out of scope.				
1	9	3.93	The welds and to certain extent base metal of the RPV and RCS should permit volumetric examination of the entire volume of the wall as well as surface examination. For example, ultrasonic, eddy current or magnetic flux methods could be used for such examinations.	Operational experience has shown that examination of base metal is useful to detect failures like cracks inside.		X		See new 3.111
1	10	3.109	Provisions should also be implemented for collecting, controlling and managing inventories from leaks during normal operation. Leaks can occur from, among others, valve stems, valve seats, pump seals and gaskets during reactor operation.	"Managing" should cover control/measurement of medium flow. This can be important for leak detection.			X	Managing is correct
1	11	3.112	Structures interfacing with the RCSASs include items such as: • Buildings supporting or housing the RCSASs as well as component supporting structures within the buildings;	Clarification of the scope might be necessary: Are component supports included in the scope or are they considered interfacing structures?				This bullet is removed. The building cannot be considered as an interface.
2	12	3.119	For the design of RCSASs proven and widely accepted codes and standards should be used. The	Clarification	X			

COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Physikerbuero Bremen and GRS) Pages: 10 Country/Organization: **Germany** Date: 16.05.2017					RESOLUTION			
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			selected codes and standards: • Should be applicable to the particular ~~concept of the~~ design;					
1	13	4.7	Provisions ensuring effectiveness and availability of the ultimate heat sink with regard to the site natural hazards should be designed with adequate margins to cope with levels of natural hazards exceeding those derived from the hazard evaluation for the site. Potentials for the loss of the effectiveness of the ultimate heat sink should be identified and evaluated.	Potentials for the loss of the UHS should be analyzed site specifically.			X	The aim is to stress that those provisions should be designed with larger margins. 4.8 + 4.9 are correct
1	14	4.26	Heat transfer should be possible despite a single failure postulated at any component necessary for transferring residual heat to the ultimate heat sink. Additionally, unavailability for maintenance or repair should be considered.	Sentence added as it is included in para. 3.41.			X	See 4.29 This clause if for a system operated in operational conditions
1	15	4.35	• A program of surveillance and control techniques should be implemented to reduce significantly the incidence of flow blockage problems from biofouling or foreign parts.	Evaluation of operational experience. Not only biofouling may lead to flow blockage problems.	X			
2	16	4.40	The heat transfer chain should have capabilities designed to simultaneously accomplish the	For clarification	X			

COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Physikerbuero Bremen and GRS) Pages: 10 Country/Organization: **Germany** Date: 16.05.2017					RESOLUTION			
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			following functions in the event of DBAs:					
2	17	5.4	To preserve the integrity of the RCS, any condition that would affect the geometry or structural characteristics of equipment, or cause the apparition of defects should be identified and prevented by design, manufacturing or operating and in service inspection provisions (in particular ~~chemical~~ corrosion, stratification, aging, etc.).	Editorial improvement: corrosion is always a chemical process.	X			
1	18	5.10	Stresses caused by normal service and upset conditions should be less than the stress limits specified for those loading conditions categories. Moreover, the design pressure and temperature should not be exceeded (exception - the design pressure may be exceeded by 10% for short durations in Service level B), and the cumulative usage factor should be less than 1.	The design pressure may be exceeded by 10% for short durations in Service level B according to current rules, e.g. German KTA 3201.2 (2013), 3.3.2.2; 3.3.3.3; and ASME III (2013), Div.1, NB 3223			X	See 5.12 and 5.13
1	19	5.11	For loading conditions assigned in emergency conditions category, the design criteria should aim at preventing the fast fracture of the equipment subjected to the primary loads, and at avoiding excessive deformation or buckling. Stresses	The design pressure may be exceeded by 20% in Service level C according to current rules, see e.g. derivations from KTA 3201.2 (table 7.7-4 with maximum allowable stresses) and			X	See 5.12 and 5.13

COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Physikerbuero Bremen and GRS) Pages: 10 Country/Organization: **Germany** Date: 16.05.2017					RESOLUTION			
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			should be less than the stress limits specified for that loading conditions category. Pressure reached during an emergency condition may exceed the design pressure, provided the overshoot is limited and of a short duration (e.g. does not exceed ~~110%~~ 120% of the design pressure).	KTA 3201.1 (Annex A with yield and ultimate strength values of the relevant materials) as well as ASME III (2013), Div.1, NB 3224				
1	20	5.28	No shut-off valves should be placed in the discharge line of a safety valve, nor between the item being protected and a safety valve. If an exception is made, there should be a redundant and diverse means to perform an equivalent safety function.	Approved design of overpressure protection in main steam system.			X	The guide should provide good practices, and for exceptions a justification should be provided See 5.33
1	21	5.85	If a leak before break or break preclusion concept is claimed for ~~the design and manufacturing of~~ piping, the specific ~~and~~ additional requirements to be met for design/manufacturing and operation ~~requirements to be met~~ should be defined.	These concepts also include specific requirements to be met for operation (e.g. control of operating conditions, in-service inspections, leak detection and operator response)	X			
1	22	5.123	Adequate instrumentation and isolation capability should be provided to detect leaks or breaks in RHR system if part of the system is implemented outside the	Under certain circumstances flooding can occur and threaten components placed in the annulus.			X	In case of a loss of coolant outside the containment minimizing the

COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Physikerbuero Bremen and GRS) Pages: 10 Country/Organization: **Germany** Date: 16.05.2017					RESOLUTION			
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			containment, in order to limit the amount of radiological releases and flooding outside of the containment.					radioactive release is the issue. Flooding one division is not for a system designed with redundant divisions
1	23	5.125 (new)	There should be a pressure difference between the intermediate cooling system and the ultimate heat sink to prevent intrusion of harmful substances into the intermediate cooling system.	The intrusion of corrosive medium for example into the ICS can lead to leakages and the unavailability of the system.			X	Flooding one division is not a safety issue (cf approach for internal hazard)
1	24	5.141	ECCS should be reliably isolated from RCS by two isolation devices in series. In order not to decrease the reliability of ECCS those isolation devices should be designed to open quickly and without external service (e.g. check valves are widely used by Member States). Leak-tightness of the RCS isolation should be designed to be periodically tested. Adequate-measurement should be installed (pressure, temperature) to detect leaking of isolation valves. Moreover, ECCS should be	Continuously control of tightness seems to be more practicable and safer then periodically testing.		Adequate measurement should be installed (pressure, temperature) for warming about leakages through the isolation valves.		

COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Physikerbuero Bremen and GRS) Pages: 10 Country/Organization: **Germany** Date: 16.05.2017					RESOLUTION			
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			protected against over pressurization caused by leakages.					
1	25	5.144	Provisions should be implemented for an early detection of leaks in the parts of the ECCS that are located outside the containment in order to isolate the system before it causes the drainage of the water reserves <u>and to prevent flooding.</u>				X	See 6.63 Flooding one division is not for a system designed with redundant divisions
1	26	5.145	For accident management, actuation and shut-down of every ECCS train should be possible from the MCR. However, stopping the operation of ECCS should not be possible <u>from the MCR</u> as long as a need for an emergency cooling of the core exists.	Stopping the system from the switch gear building is always possible.	X			
1	27	6.14	The RCPB should be provided with an overpressure protection system relying on redundant SRVs. <u>Diversity in the SRV design should be considered.</u> The settings….	SRV are of extraordinary safety importance. SRV of the same design are susceptible to common mode failures. These failures should be avoided.			X	Diversity among the safety valves is not required. diversity should exist between pressure control and the over pressure protection system
1	28	6.99	SLCS should have capability to ~~to~~	In cases of loss of coolant,	X			See 7.26

COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Physikerbuero Bremen and GRS) Pages: 10 Country/Organization: **Germany** Date: 16.05.2017					RESOLUTION			
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			shut down the core and to maintain sub criticality in the most reactive <u>normal operational</u> state with sufficient margin for uncertainties~~in the event of ATWS.~~	the SLCS will not always be capable to bring enough liquid neutron absorbing material to the core. In cases where the SCRAM system is actuated (needed), it will not always be possible for a reasonable SLCS to shut down the reactor fast enough. The intention of the requirement should be checked or restricted (as proposed in the left column).				
1	29	Common for chapters 5, 6, and 7	Common wording for PWR, BWR and PHWR as far as technically justified.	These paragraphs contain generic recommendations that apply to PWR, BWR and mostly also to PHWR. They should be consolidated. That would clarify communalities and differences between the reactor types and make the guideline much shorter.	X			See the complete new structure of DS 481, section 5

India

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB **Date**:**16th May 2017**				**RESOLUTION**			
Comment No.	**Page/ Para/Line No.**	**Proposed new text**	**Reason**	**Accepted**	**Accepted, but modified as follows**	**Rejected**	**Reason for modification / Rejection**
1.	3.1 7 /2.1/1st bullet	RCS provides a confinement barrier for the protection of plant workers, ~~and~~ the public **and environment** from radioactive material;	The environment also needs to be protected against the effect of radioactive material.	X			
2.	3.1 8/2.1/2nd bullet	**Facilitate to** shut-down the reactor and control the core reactivity to ensure compliance with fuel design limits in operational states and in accident conditions;	RCS facilitates shutdown in certain designs			X	Shutdown the reactor is primarily addressed in DS
3.	3.1 8/title of 2.6	**SYSTEMS FOR COOLANT INVENTORY CONTROL IN OPERATIONAL STATES**	For better clarity	X			
4.	General	In some sections Seismic Load of SL-2 is mentioned while at many other places Seismic Category 1 is mentioned. It may be pertinent to use a single terminology.	For ensuring uniformity.				SL-2 is preferable

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB **Date**:**16th May 2017**				**RESOLUTION**			
5.	3.1 12/3.14 and 3.21	Clauses 3.14 and 3.21 are combined as given below: 'Methods, design and construction codes and standards used should provide adequate margins to justify that cliff edge effects would be avoided in the event of an increase of the severity of both internal and external hazards.	The clauses 3.14 and 3.21 may be deleted. Additional 'General' clause should be introduced after 3.6. Repetition is avoided and the clause is applicable to both internal and external hazards.			X	With regard to the structure of this SG (separated paras for Internal and External Hazards, I would also rather keep the 2 recommendations separated.
6.	3.1 15/3.37	As multiple failures are likely caused by the occurrence of dependent failures that may lead to the failure of the safety systems, an analysis of dependencies between redundant trains of safety systems or between diverse installed capabilities to shut down the reactor, to remove residual heat from the core and transfer residual heat to the ultimate heat **sink** should be conducted to identify relevant possibilities for DECs.	Editorial	**X**			

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB			**Date**:**16th May 2017**	**RESOLUTION**			
7.	3.1 23/3.84	The design should incorporate provisions to facilitate in service inspection, maintenance, repair and modifications to be carried out during the construction~~, and~~ commissioning and operation Phases.	ISI, maintenance, repair and modifications are required to be carried out in Operation phase also.	**X**			See 3.101
8.	3.1 24 /3.92/ Bullet point 3.	~~Code~~ Hydrostatic test of the RPV and RCS **should be carried out as per the design & manufacturing Code requirements once installation is complete;**	For Better Clarity	X			See 3.110
9.	3.1 25-26/3.99	Last Bullet should be modified as: Provisions to facilitate testing, inspection, repair and replacement.	The consideration should also be given during the layout design for checking the feasibility for repair and replacement.	**X**			
10.	3.1 28 /3.114	**Suggestion:** Include TSC in the list of abbreviations		X			
11.	3.1 32 /4.17	**Suggestion:** The sentence seems incomplete and may be re-worded.	Editorial	X			

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB			**Date**:**16th May 2017**	**RESOLUTION**			
12.	3.1 33/RESIDUAL HEAT TRANFER SYSTEMS	The intermediate cooling system is designed as a closed loop system which transfers heat ~~loads~~ from **residual** heat ~~residual~~ **removal** systems to the cooling system directly associated to the ultimate heat sink.	Editorial	**X**			
13.	3.1 33/4.22	To ensure effectiveness of the defense **in** ~~of~~ depth strategy the different means provided should be independent to the extent practicable, in particular a different and independent heat transfer chain should be implemented for accidents with core melting [15].	Editorial	X			See 4.24
14.	3.1 38/5.6/2nd line	…Where such materials are used for ~~t~~ manufacturing, the….	Editorial	X			
15.	3.1 43 / 5.46/ 1st para	Failures of any component or system and operator errors whose consequences would modify RCS conditions or loads defined for normal operation should be identified and primarily categorized in a plant state category on the basis of its frequency to occur (seeparagraph**3.3** ~~3.4~~).	Reference should be made to Para 3.3 of the draft document.			**X**	The structure of the document is clear enough: Section 3 provides the more important recommendations and section 5-8 provide more detailed recommendations.

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB			**Date**:**16th May 2017**	**RESOLUTION**			
16.	3.1 55/5.130/2nd para, 4th bullet	**Clarification:** Does total loss of feed water with primary feed and bleed strategy refers to "Total Loss of Feed Water with availability of Primary System Feed and Bleed"					Yes
17.	3.1 59/4th para/3rd and 5th bullet	**Clarification:** Whether 5th bullet refers to a Passive Residual Heat Removal System (PRHR)					Yes
18.	3.1 61/ 4th para/6	Proposed text: During shut-down conditions, Anticipated Operational Occurrences (AOOs) and ~~Design Basis~~ Accidents **conditions** ~~(DBA)~~ residual heat is transferred from the RCS to the Ultimate Heat Sink (UHS) utilizing various systems such as Reactor Core Isolation Cooling System (RCIC) or the Emergency Core Cooling System (ECCS) in conjunction with the Component Cooling Water System (CCWS) and the Essential Service Water System (ESWS).	The DBA should be replace with accident conditions in order to include DEC.				The correct use of "DBA" or "accident conditions without significant core degradation" has been checked in the whole document.

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB			**Date**:**16th May 2017**	**RESOLUTION**			
19.	3.1 75/6.85/ last para/	**Suggestion:** Include Information related to Reactor Core Isolation Cooling System (RCIC).	Although Section 6.78-6.83 are applicable to RCIC but a separate heading on the same may be provided for better clarity.				
20.	3.1 75/ CONNECTED SYSTEMS	Add another bullet - Shutdown cooling system	Shutdown cooling system is important system of PHWR design so it should be reflected.	X			See 8.1
21.	3.1 79/ addition of bullets	Suggested Additions: • The shut-down cooling system • The cleanup of reactor coolant	Requirement 50 (cleanup of reactor coolant) as per [2] to be added in the text			X	The cleanup system is considered as an auxiliary system and is addressed in DS 440
22.	3.1 80/7.9	**Clarification:** The use of text "specific DBA" in the section may be elaborated.					Moved to new section 5. This is a recommendation that applies to all the 3 technologies
23.	3.1 81/7.17 & 7.19	**Clarification**: Which weld joints are referred here in the text, is it for welds in calandria tubes?		X	Suggest deleting this Clause. This guidance is originally from Clause 4.8 of the guidance NS-G-1.9 but is replaced with Clauses 3.98 and 3.99 (general design of RCS) of the new guide which captures its intent.		

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB			**Date**:**16th May 2017**	**RESOLUTION**			
24.	3.1 83/after 7.39	Title to be added: Piping systems	The clauses from 7.40 to 7.46 applicable to Piping systems (not related to Steam generators).	X			See paras. “Layout” and “piping” in the new section 5
25.	3.1 85/7.59	The configuration of the **pressurizer and bleed condenser** vessels, the layout of the spray lines and nozzles, the layout of the surge line should avoid or minimize the low and high cycle fatigue, thermal stratification, and accumulation of condensate.	For Better Clarity			X	This clause was deleted (a bit too detailed for the Safety guide)
26.	3.1 86/7.74	The overpressure protection devices should include redundant safety valves. The setting of the safety valves should be such that **there is sufficient margin from the operating pressure of RCS so that they do not open to avoid unnecessary discharge of coolant**. ~~safety valves open in sequence for different levels of pressure to avoid unnecessary discharge of coolant.~~	In PHWR design there is no sequential opening of overpressure protection devices.	X			See new 5.27 CNSC agrees with such a recommendation

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB **Date**:**16th May 2017**				**RESOLUTION**			
27.	3.1 87/7.77	Present clause: Diverse technologies should be used for pressure and inventory control, and the overpressure protection devices to reduce the likelihood of common cause failure. Proposed: Diverse technologies should be used for pressure and inventory control, and the overpressure protection devices, **as far as possible,** to reduce the likelihood of common cause failure.	To comply with all type of PHWR designs.	X			See common recommendations in the new section 5. See 5.19 and 5.20
28.	3.1 87/7.79	In case of overpressure due to design basis ~~accident~~ **transient** conditions, analysis should be performed to demonstrate that the acceptance criteria are met.	The sequence of events considered as the basis for sizing of over pressure protection devices is a transient and not an accident.	X			See common recommendations in the new section 5 .
29.	3.1 88/7.81	PHWRs should be equipped with a fast depressurization of the primary circuit by the crash cool-down of the steam generators secondary side (or equivalent) using the **steam discharge valves and/or steam relief valves.**	For Better Clarity			X	Better not to indicate a solution which is design dependent

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB **Date**:**16th May 2017**				**RESOLUTION**			
30.	3.1 89/7.87	Provision should be made to control the ~~system~~ **steam** pressure and the ~~coolant~~ **water** inventory in the steam generators during start-up.	For better clarity	X			See 8.10
31.	3.1 89/7.92	**Redundant** Heat removal **systems** should be provided to the extent necessary to permit controlled cool-down of the RCS when the ultimate heat sink is not available or the main steam line is isolated.	Editorial		X A diverse heat removal …		See 8.15
32.	3.1 90/7.95	The system that controls the steam generators pressure should use steam discharge valves. The~~se~~ relief valves-should also **be** provide**d** ~~be~~ ~~in addition~~ ~~to~~ **for** overpressure protection of the steam generators secondary side i.e in addition to the main steam safety valves (MSSVs).	For better clarity		X Relief replace discharge, Also provide for an overpressure protection		See 8.18
33.	3.1 90/7.96	The materials used in the main steam and feed water system should have fracture toughness properties that afford protection against brittle fracture under all modes of plant operation for plant lifetime and should be compatible with the chemistry of feed water **in case LBB criteria is applied.**	As this is not always applicable in PHWRs		X “in case a behavior LBB is claimed for the piping		See 8.19

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB **Date**:**16th May 2017**				**RESOLUTION**			
34.	3.1 90/7.100	The main steam (safety and/or relief valves) devices **and discharge valves** should be capable of dissipating heat from the steam generators when the main condenser is not available for heat removal.	For better clarity				See the parenthesis: Relief valve is used for discharge valve
35.	3.1 91/1st para	The SDCS consists of pumps and heat exchangers connected between the inlet and outlet headers of each primary heat transport system (PHTS) loop. The system is normally full of heavy water and is normally isolated from the PHTS~~. by two valves in series.~~	As this is not applicable as providing two 'closed' valves in series would not ensure reliable function of SDCS in PHWRs.	X			See 8.27
36.	3.1 92/3rd bullet	**Suggestion:** Clauses on Emergency Feed Water System may be provided			Suggest deleting the bullet of emergency feedwater system, because it is described in emergency heat removal system section.	X	

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB **Date**:**16th May 2017**				**RESOLUTION**			
37.	3.1 92/7.114	An auxiliary feed water system or equivalent should be designed to maintain the plant in a hot standby condition for an extended period. The auxiliary feed water system should provide sufficient capacity to fulfil this function efficiently. Where a connection to the Reserve feed water/**Deaerator** is not possible, an alternate means to supply the auxiliary feed water to steam generators to be provided in the design.	For Better Clarity	X			See 8.39
38.	3.1 92/7.115	The design of the auxiliary feed water system should include connection lines to supply water into steam generators from the reserve water tank (also called the containment water tank or the dousing reservoir **or Fire water system**). Means for recording the amount of water supplied into the steam generators should be provided.	To comply with all type of PHWR designs		X and also from the fire engines or mobile diesel-pumps		See 8.40

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB			**Date**:**16th May 2017**	**RESOLUTION**			
39.	3.1 92/7.116	The design of the auxiliary feed water system should include connection lines to supply water into steam generators from **fire water system or** the fire engines or mobile diesel-pumps. Means for recording the amount of water supplied into the steam generators should be provided.	Better clarity		This clause has been removed.		
40.	3.1 96/title after 7.145	**Suggestion:** The complete section may be re-written for better clarity.	EHRS explained here, are for SG as well as other systems cooling like moderator system, shield cooling system etc. This shall be separately described as EHRS for SG (passive & active provisions) and EHRS (Hookup-active provision) for other systems cooling so that it complies with all type of PHWR designs. In other words, the clauses under this title need complete overhauling/to be rewritten to comply all type of PHWR design. Also EHRS is to cater DECs without core melt (not for DBA).			X	The clauses for Moderator system or SDCS are described under the title of "Recommendations for heat transfer for DEC".

COMMENTS BY REVIEWER **Reviewer: AERB, India** **Country/Organization** : India, AERB			**Date**:**16th May 2017**	RESOLUTION			
41.	3.1 94/7.127	The emergency core cooling system injection capacity should ensure core re-flooding in case of design basis LOCA, according to the applicable acceptance criteria (~~e.g.: maximum fuel sheath temperature).~~	Deleted as it is a PWR ECCS acceptance criteria, not for PHWR.	**X**			See 8.56 (new numbering)
42.	3.1 81/7.14	All materials used in the fuel channel assembly must withstand prolonged exposure to the following environments: radiation, high-purity heavy water and the ~~cover~~ **annulus** gas (e.g., the gas between the pressure tubes and the calandria tubes).	For better clarity	**X**			See 5.86 new specific section for RCS
43.	New clause proposed	**Suggestion for addition:** The coolant system design shall ensure for timely detection of any failed fuel from the core during nuclear power plant operation.	This is part of reactor and associated system design.	**X**	5.93, "The design should provide a means for allowing reliable detection of fuel defects in the core during normal operation."		See 5.93 new specific section for RCS
44.	General comments on the Guide	**Clarification:** Description on RRS and SDS-2 in RCS of PHWR may be reviewed.			Please see new paras. 8.2-8.4 (updated RRS and SDS2)		

Japan

COMMENTS BY REVIEWER Reviewer: Country/Organization: Japan				RESOLUTION			
		Page of 16 Date: 2 May, 2017					
Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
1.	General	Some of the following comments are presented based on the products of MDEP/CSWG, especially, Technical report TR-CSWG-03 "the Fundamental Attributes for the design and construction of reactor coolant pressure-boundary components" and Technical report TR-CSWG-04 "the essential performance guidelines for the design and construction of pressure boundary components." These documents are found in following website; http://www.oecd-nea.org/mdep/working-groups/cswg.html Relevant comments are indicated with an asterisk* in the "Para/Line No." column.					
2.	General	Both term "significant fuel degradation" and "significant core degradation" is used in this draft. Suggested to be written using "significant fuel degradation" in accordance with the term defined in 2016 revision of IAEA SAFETY GLOSSARY and definitions in SSR-2/1 (Rev. 1).				X	Significant core degradation is better in DS 481 that is for the design of the RCS and RCSASs.
3.	3.6	Keep order of "contents" of Section 3 with modifying/adding some key element for RCSAS. • The safety function(s); • The postulated initiating events they have to cope with; • The protection against the effects of internal hazards; • The protection against the effects of external hazards; • The protection and mitigation against accidents conditions; • Design limits and acceptance criteria; • Reliability, capability and functionality to achieve the safety function(s); • Provisions against common cause failures within a system and between systems belonging to different levels of defence in depth;	To keep consistency with the contents of this section.	X			

COMMENTS BY REVIEWER Reviewer: Country/Organization: Japan			Page of 16 Date: 2 May, 2017	RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
		• The safety classification; • Environmental conditions for qualification; • Design loadings with appropriate margins and service conditions; • The engineering design criteria applicable to structures and components, including ~~S~~selection of materials, manufacturing and installation, examination and testing, and overpressure protection; • The engineering design criteria applicable to the system; • ~~Monitoring and control capabilities;~~ • Provisions for ~~testing, inspection,~~ maintenance and decommissioning.					
4.	3.67*	**LOADS AND LOAD COMBINATIONS** The design basis of each component of the RCSASs should include, for each plant state and/or service conditions, the loads and load combinations that components must withstand.	To include test conditions, one of the state considered in component design.	X			See 3.75
5.	3.69*	All loads (static and dynamic) that are foreseen to occur should be grouped corresponding to plants states and/or service conditions in consideration of probability of occurrence, operating experience and engineering judgment.	Completeness. Type of loads is tied to plant states.		X this recommendation has been merged with 378	X	See 3.78
6.	3.70*	Move before para 3.67. Loads should be identified and analysed with account taken of: • Load type (i.e. static and permanent loads, or transients and dynamic, global or local); • Timing of each load (to avoid the unrealistic	Logical order in this sub-section.	X			See 3.77

COMMENTS BY REVIEWER Reviewer: Country/Organization: Japan		Page of 16 Date: 2 May, 2017		RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
		superposition of load peaks if they cannot occur coincidently).					
7.	3.71*	Design basis loading conditions should be defined by identifying the various kinds of internal and external loads, which include loads due to natural phenomena, and should be assigned in different categories….	Completeness.		X Design basis loading conditions, including internal and external hazard loads, should be assigned in different categories in accordance with plants states and/or service conditions	X	See modified 3.78
8.	New para after 3.71*	3.71A Based on these loading conditions, design loadings such as design pressure, design temperature and design mechanical loads for pressure retaining components should be defined in the design specification. (i) The design pressure should be specified such that it should not be less than the maximum difference in pressure between inside and outside of the components that exists under the normal and major transient operating conditions of a nuclear power plant. The design pressure should include allowance for pressure surge, system error, and static pressure heads. (ii) The design temperature should be specified such that it should not be less than the expected maximum mean metal temperature through the thickness of the parts considered, that exists under the normal and major transient operating conditions of a nuclear power plant. (iii) The design mechanical loads should be selected	It should be described to define design pressure and design temperature which appear in the following section.		X Appropriate acceptance criteria (e.g. design pressure and temperature, stress limits) to be met for ensuring integrity should be defined and be appropriate to each load combination with account taken of the load combination category.		The purpose of the safty guide is not to provide a definition of the design pressure and temperature. But as those 2 parameters can be used as acceptance criteria in the structural analysis of a component, both of them should be defined.

COMMENTS BY REVIEWER Reviewer: Page of 16 Country/Organization: Japan Date: 2 May, 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
		such that, when combined with the effects of design pressure, they produce the highest primary stress.					
9.	New para after 3.72*	Add new paragraph on the component under external pressure 3.72A The criteria for the permissible external pressure for the material and configuration of components that are subject to be under external pressure should be determined, taking into account the buckling behaviour of the component under the external loads.	Consideration on the component under external pressure should be described.	X			Added in 3.79
10.	New para after 3.72*	Add new paragraph on applying design by analysis. 3.72B For the components of highest classification, a stress analysis of a component should be carried out in sufficient detail to show that each stress limit defined for each stress category and each service level is satisfied when the component is subjected to design basis loadings. The theory of failure (e.g. maximum shear stress), on which the detail stress analysis is based, should be identified. 3.72C The criteria for the acceptability of design by analysis are as follows; (i) The stress intensity should not exceed prescribed limits which will be determined on each stress intensity category and on combinations of stress intensity categories. (ii) The design details should conform to rules determined for each component.	Consideration of stress analysis should be described.		X The stress levels may be different for the different modes of failure (e.g. progressive deformation and fatigue or excessive deformation and plastic instability). Protection against brittle fracture should be ensured, and the critical buckling stress should be considered if relevant for the component.		

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Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
		(iii) Where compressive stress occurs, the critical buckling stress should be considered. (iv) Protection against brittle fracture should be ensured.					
11.	3.78*	**MATERIALS** The materials used for the pressure retaining boundary of the RCSASs should be specified with regards to chemical composition, microstructure, mechanical/thermal properties, heat treatment, and manufacturing requirements and activation of materials, as applicable. The materials should be homogeneous and compatible with the coolant that they contain, with joining materials (e.g. welding materials), and with adjoining components or materials such as sliding surfaces, spindles and stuffing boxes (packing boxes), overlay or radiolysis products. The specifications on welding materials used for manufacturing or repair of components also should be established so that the welds have sufficient strength and toughness and are free from harmful defects. Materials and welds specified for the RCSASs should comply with the applicable provisions of the code used, including but not limited to the following properties and characteristics:	Addition of basic specifications of materials and welding.		X Ok except for ” RCSASs ~~and welds~~ should comply		
12.	3.80*	Materials should be selected to be suitable for the service conditions expected in all operational states and accident conditions, so as to minimize any significant degradation during the lifetime of the	Addition of purpose of original text.		X ” during the lifetime” has been aded		See above

COMMENTS BY REVIEWER Reviewer: Page of 16 Country/Organization: Japan Date: 2 May, 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
		component taking into account the operating environment.					
13.	New paras after 3.80*	Add the paragraph on test coupons and testing of material as follows; 3.80A Almost of the materials used for pressure retaining components may be heat treated through processes such as quenching and tempering. The tensile and impact test coupons should be obtained and heat treated in the same manner as the component. The procedures for obtaining test coupons, including their number, orientation and location, should be specified for each product form such as plates, forgings, bars, tubular products and fittings. 3.80B Pressure retaining materials and materials welded thereto should be impact tested, except those kinds of the materials for which exclusion of impact test is authorized owing to materials smaller or thinner than prescribed limits. Those test data should be used as baseline data for in-service operation of the component and for use in fracture prevention evaluation. 3.80C Also, they should be examined by non-destructive methods applicable to the material and each product form. The acceptance criteria should be specified. Repair by welding should be permitted except for bolting material, when specified conditions on repairing are met.	It is important to describe some tests are performed on material itself.			X	Very detailed but a recommendation to specify the acceptance criteria for the tests perfomed on samples have been added
14.	3.83	The materials used in this application should take into consideration the followings to minimize the harmful effects on materials:	Ditto.			X	Not necessary to give the justification

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Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
15.	New para. After 3.83*	Add the paragraph on welding material Welds should have strength greater than the weakest base metal materials. The welds should have complete fusion and should not have harmful defects in the form of cracks, undercut, overlap, crater, slag inclusion, blowholes, etc.	Recommendation on welding material should be included.			X	Welds are weak points and the remaining is too detailed for this Safety Guide.
16.	New subtitle and new para.*	**MANUFACTURING and INSTALLATION** The following recommendations provide guidance to fulfil part of the overarching requirement 11 of [2]. The RCSAS, especially pressure boundary components, should be manufactured and installed in accordance with established processes that ensure the achievement of the design specifications. The quality assurance programme should be established for manufacturing process including identification and traceability of materials, welding, handling, and storage of manufactured components. 3.83A The following aspects of manufacturing should be specified. (i) The permitted type of weld joint designs should be defined for each group of weld joints categories which are made according to the configuration and location of the weld. (ii) The welding qualification for both welding procedures and welders should be defined to ensure reliability of the welding before the welding is performed. (iii) Dimensional tolerances on forming, machining	To add manufacturing and installation phase to link between design phase and operation phase.			X	The RCSAS, especially pressure boundary components, should be manufactured and installed in accordance with established processes that ensure the achievement of the design specifications. The quality assurance programme should be established for manufacturing process including identification and traceability of materials, welding, handling, and storage of manufactured components. That is OK for the safety guide. The other recommendations are given by the manufacturing code

COMMENTS BY REVIEWER Reviewer: Country/Organization: Japan		Page of 16 Date: 2 May, 2017		RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
		and aligning should be defined. (iv) The measures for material pre-heat treatment and post weld heat treatment should be specified.					
17.	3.87	Move before 3.84. The design should establish a technical basis for SSCs that require inspection, testing, maintenance and monitoring.	Suggest to come first in description for subtitle "CALIBRATION, …", as this para describes overall view on this topics.	X			
18.	3.84-3.96	**CALIBRATION, TESTING, MAINTENANCE, REPAIR, REPLACEMENT, INSPECTION AND MONITORING** For information on the following comments; Following comments on paragraphs 3.84-3.96 are presented with focusing on the aspect of testing and inspection for RCSAS considered during design and construction stage, including commissioning stage.	This documents is dedicated to "design" aspect of RCSAS and then suggested to focus on testing and inspection considered during the stage of design and construction including commissioning.		_	_	_
19.	3.84	SSCs, especially the SSCs important to safety should be examined as required to ensure their capability for performing their functions and to maintain their integrity in all conditions specified in their design specifications. Therefore, the design should incorporate provisions to facilitate ~~in service~~ examination and testing and inspection, ~~maintenance, repair and modifications~~ to be carried out during the construction and commissioning phases ~~should be identified~~.	(i) to add the reason to describe provisions for inspection, etc. (ii) activities on maintenance, repair and modifications are not suitable for commissioning phase. (iii) there is no reason to limit "in-service		X		Included in 3.96 and 3.98

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Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
			inspection", rather "examination and testing" is preferable to include all activities on inspection.				
20.	3.85	SSCs important to safety should be designed and located to make surveillance and maintenance simple, to permit timely access, and in case of failure, to allow diagnosis and modifications or repair, and minimize risks to maintenance personnel.	Completeness.			X	Excessive. Difficult to imagine further modifications when you design the plant
21.	3.86	The development of strategies and programs to address ~~in-service~~ inspection, testing, maintenance and monitoring is a necessary aspect of RCSAS design.	Every kinds of inspections should be included.	X			
22.	3.87	The design should establish a technical basis for SSCs that require ~~in-service~~ inspection, testing, maintenance and monitoring.	Ditto.	X			
23.	Sub-title before 3.89	Specific recommendations for ~~Pre-service and in-service inspection~~ commissioning test of the Reactor Coolant System	Pre service and in-service inspection are some samples of different type of tests carried out during commissioning stage.			X	
24.	3.89	The components of the RCPB should be designed, manufactured and ~~arranged~~ installed in a manner ….	Better wording.	X			
25.	New para after para. 3.90*	3.90A Non-destructive examination should be defined and conducted on welds and weld claddings to ensure their acceptability for structural integrity, on the basis of pre-defined acceptance criteria for each type of non-destructive method. The personnel, equipment and	To be suggested to describe general view on non-destructive examination.	X			

COMMENTS BY REVIEWER Reviewer: Page of 16 Country/Organization: Japan Date: 2 May, 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
		procedures should be qualified prior to performing the non-destructive examination.					
26.	Subtitle before 3.91	~~Pre service~~ Inspection and testing during commissioning stage	Pre service inspection is one of the tests carried out during commissioning stage.			X	
27.	3.91	Prior to the start of operation, a ~~Pre-Service-Inspection (PSI)~~ commissioning test program should be developed and performed.	Ditto. Specific recommendations on PSI should be merged in para 3.92.-2nd bullet			X	
28.	3.92	The RPV and RCS should be subject to examination or tests to ensure that the vessel and components have been correctly manufactured and installed, with establishing the methods and requirements on examination and tests.	To link test requirement with items on examination and/or testing described the items listed below in the text.		X The last part is not retained ~~with establishing the methods and requirements on examination and tests.~~		
29.	3.92 2nd bullet	Add following sentence at the end of description; A Pre-Service-Inspection (PSI) program should be developed in conjunction with ISI program.	Clarification by adding the purpose for performing PSI.			X	This recommendation is more appropriate for the operation
30.	3.92 4th bullet*	Move the 4th bullet after para 3.83 with creating new para. ~~•Establishment of a surveillance sample program utilizing material samples that are installed in the RPV and removed on a scheduled basis. These samples when removed are subject to mechanical testing, including tensile strength and charpy impact or fracture toughness testing. Other samples or monitoring materials are analysed to measure the irradiation fluence that the RPV wall and the samples are being exposed to.~~	This paragraph should be moved after para. 3.83, under the subtitle "*Material exposed to high neutron flux*".	X			

COMMENTS BY REVIEWER Reviewer: Country/Organization: Japan			Page of 16 Date: 2 May, 2017	RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
		3.83A Establishment of a surveillance sample program should be established with utilizing material samples that are installed in the RPV and removed on a scheduled basis. These samples when removed are subject to mechanical testing, including tensile strength and charpy impact or fracture toughness testing. Other samples or monitoring materials are analysed to measure the irradiation fluence that the RPV wall and the samples are being exposed to;					
31.	Subtitle before 3.93	Specific recommendations for ~~In service~~ inspection ~~(ISI)~~ and testing	Descriptions from para 3.93 to 3.95 are not limited to in-service inspection.			X	
32.	Subtitle before 3.96	Specific recommendations for ~~in service~~ inspection of the steam generators:	This message is applied also to the inspection carried out in the stage of commissioning.	X			
33.	3.97	**OVERPRESSURE PROTECTION** All pressure retaining components of the RCSASs should be protected against overpressure conditions generated by component failures or by abnormal operations in order to ~~observe the pressure limits~~ ensure their structural integrity, in compliance with applicable proven codes and standards, so as to prevent the release of radioactive material to the environment, especially from the primary pressure boundary components.	"to observe the pressure limits" does not make sense. Suggested to describe the technological purpose of overpressure protection.		X The last part is not retained: ~~so as to prevent the release of radioactive material to the environment, especially from the primary pressure boundary components~~.		Not needed
34.	After 3.97	Add the recommendation on overpressure protection。 3.97A The design of pressure relief devices	Fundamental performance on over pressure protection		X		See new text

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		should be such that they have a mechanism that works reliably, that is, they should actuate when requested and return to initial position immediately after pressure would decrease under prescribed set value. 3.97A Pressure relief devices should be installed as close as practicable to the major source of over pressure anticipated to arise within the system when the operating conditions would cause the service limits to be exceeded. The installation of the device should be such that there would be no adverse effects on the function of the system. 3.97B The total relieving capacity should be sufficient to limit the maximum system pressure such that the requirements of stress limits for the service condition are satisfied for each of the components of the system for which overpressure protection is provided, under each of the unexpected system excess pressure transient conditions. 3.97C For ensuring sufficient reliability of relief function, the design should be such that the required relieving capacity for overpressure protection of a system is provided by the use of at least two pressure relief devices. When a single relief device is used, sufficient reliability of the device should be demonstrated during the development stage of the device. 3.97D The set pressure of at least one of the pressure relief devices connected to a system should not be greater than the design pressure of any component within the pressure-retaining	should be included.				

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Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
		boundary of the protected system.					
35.	3.106	**COMBUSTIBLE GAS ACCUMULATION IN NORMAL OPERATION** Design and layout provisions should be taken to prevent accumulation of combustible gases at the upper parts of components ~~and piping~~ (e.g. upper part of the reactor pressure vessel, pressurizer, safety valves) and piping.	Example in the parentheses does not include piping-related equipment.	X			
36.	3.120	**CODES AND STANDARDS** Codes and standards have been developed by various national and international organizations, covering areas such as: • Materials; • Manufacturing ~~(e.g.~~ including welding~~)~~ and installation; • Examination including pre-service and in-service inspection and testing; • Over-pressure protection; • Civil structures; • Pressure vessels and pipes; • Instrumentation and control; • Environmental and seismic qualification; • ~~Pre-service and in-service inspection and testing;~~ • Quality assurance; • Fire protection.	Suggest the topics related to mechanical design being get together.			X	The list provides examples
37.	Footnotes 7, 9, 10, 11,	The number of applicable mechanical code of Japan is JSME SNC1, not JSME SNC2 nor 3.	Editorial. Correction of applicable Japanese code number.	X			Whatever the safety class?

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Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
	12						
38.	5.2. (for PWR)	**Structural design of the reactor coolant system** The assurance that the quality will be achieved should make necessary a qualification of the manufacturing process, including identification and traceability of materials, welding, handling, and storage of the components, implemented at the factory.	To explain manufacturing process of a component.				Moved in section 3
39.	5.43 /L3	**Isolation of the Reactor Coolant Pressure Boundary** Adequate isolation should be provided at the interfaces between the RCS and connected systems operating at lower pressures to prevent the over pressurization of such systems and possible loss of coolant accidents. In any case the possibility of a LOCA occurring in the lower pressure designed piping should be eliminated to the extent practical. This is an event known as an Inter-Systems LOCA (ISLOCA).	The same description as para 6.28 on ISLOCA in BWR should be included in PWR.		X		See 5.49
40.	5.94/L 2	**Core reactivity control** The CVCS should be designed to adjust RCS boric acid concentration in order to control core axial ~~off set~~ offset during power operation.	Editorial.	X			
41.	6. (for BWR) 2nd bullet of introduc	**Structural design of the reactor coolant system** • The manufacturing and control processes, including identification and traceability of materials, welding, handling, and storage of fabricated	Ditto.		X		See 5.3

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	tion	components, that should provide assurance of a very high quality product, based on proven industrial practices;					
42.	6.5	**Structural design of the reactor coolant system** Equipment of the RCS should be designed so that the stresses imposed upon it remain below the values defined for structural materials to prevent a fast crack growth during normal operation, anticipated operational occurrences, design basis accident and design extension conditions ~~accidents~~ without significant ~~core~~ fuel degradation.	Consistency with plant states defined in SSR-2/1 (Rev. 1).	X			
43.	6.18	**Pressure control and overpressure protection** The pneumatic pressure required to open and to maintain open the necessary number of SRVs should be evaluated and dedicated design provisions should be implemented to ensure the opening of the SRVs. The operability of SRVs during the DECs such as SBO should be considered.	Lessons learnt from Fukushima-Daiichi NPPs accidents.				See 5.102
44.	6.43	**Layout** Add the following sentence at the end of this paragraph. Especially, consideration should be taken of minimizing accumulation of combustible gas in steam piping system, including small piping attached to prime steam piping, in order to prevent detonations of hydrogen, which could be generated through radiolysis in reactor core.	To describe the protection of accumulation of combustible gases explicitly.			X	See para. 5.60

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Comment No.	Para/Line No.	Proposed new text	Reason	A	A with modifications	R	Reason
45.	6.55	**Venting** During normal operation venting of the RPV head and piping to prevent the accumulation of non-condensable gases should be possible.	Ditto, especially for piping.	X			See 5.69
46.	6.70	Piping system Piping, including small piping attached to prime steam piping, should be arranged to limit the possibility of accumulations of non-condensable gases in order to prevent possible detonations of hydrogen and oxygen that might be generated through radiolysis of coolant in reactor core.	Ditto.	X			See para. 5.60
47.	6.93	**Core cooling in case of design extension conditions** Design extension conditions requiring additional needs (safety features for DECs) are reactor technology / design dependent, and they should be postulated ~~either~~ both applying a deterministic ~~or~~ and supported by the outcomes of PSA.	GSR Part 4 (Rev. 1) mentions that DSA and PSA should be used.	X			
48.	6.97	Add the following sentence. Operability of the valve of turbine driven water supply system such as RCIC by using compressed air, DC power or human power should be ensured in case of Station Blackout (Loss of all AC power).	Lessons learnt from the Fukushima-Daiichi NPPs accidents.	X			See 7.23
49.	6.99	SLCS should have capability to ~~to~~ shut down the core and to maintain sub criticality in the most reactive state with ~~sufficient~~ adequate margin for uncertainties in the event of ATWS.	To keep consistency with SSR-2/1 (Rev. 1) or other documents.	X			See 7.26
50.	6.101	What does "neutron absorbing material" mean by	Clarification.				

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		that? SLCS is already mentioned in accident conditions such as ATWS.					

Poland

COMMENTS BY REVIEWER Reviewer: Country/Organization: PGE EJ1 / Poland			Date: 2017-04-05	RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	**General comment** Entire document	Fix document page numbering.	There is incorrect document page numbering provided: - Page numbering starts from 3rd page only. - Only odd pages are numbered, i.e. 3, 5, 7, etc. - Used page numbering format "3.1 X" seems incorrect. It is not clear what 3.1 means next to the page number.				
2.	**General comment** Page 101	Add to the list of the abbreviation the definition for the following abbreviations: PSI, ISI, TSC, CVCS, SL2, RCP, CDF, NPSH, EFW, SGTR, SBO, RCIC, CCWS, ESWS, ECC, RMI, RWCU, ICS, PSA, SLCS, IBIF, EPS	The list of abbreviations provided at the end on guide is not complete and comprehensive. It is recommended to add definitions of missing abbreviations to the list.				The list of abbreviations will be fixed after the technical editing review

COMMENTS BY REVIEWER Reviewer: Country/Organization: PGE EJ1 / Poland Date: 2017-04-05				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
3.	**General comment** From page 11 till page 33	"The following recommendations provide guidance to fulfil the ~~overarching~~ Requirement 17 of [2]…" Remove "overarching" in the annotations before following paragraphs: 3.11, 3.30, 3.32, 3.38, 3.40, 3.54, 3.59, 3.78, 3.84, 3.100, 3.118, 3.119, 4.19	Usage of term "overarching" in the reference to SSR-2/1 Rev.1 general requirements is surplus and does not provide additional information. It should be noted, that term "overarching" was used only till the 4.19 paragraph and later was skipped. For the guide text harmonization the term "overarching" should be removed in the entire guide.	X			
4.	**General comment** Entire document	Preamble before paragraph 3.11: "The following recommendations provide guidance to fulfil the ~~overarching~~ Requirement 17 of [2] regarding Internal and external hazards evaluation and consideration in the design with its associated requirements, and the specific requirement 5.16 ~~specific~~ related to "Internal Hazards"." Preamble before paragraph 3.30: "The following recommendations provide guidance to fulfil the ~~overarching~~ requirements 19 and 25 of [2] regarding design basis accidents consideration and single failure criterion incorporation in the plant design." Preamble before paragraph 3.40:	At each subsection beginning there are provided preambles with references to SSR-2/1 Rev.1 general requirements but without specification of requirement itself. As of that the object of consideration remains unclear. In order to make the guide more understandable and easy readable as stand-alone document the main objectives of referred general requirements from SSR-2/1 Rev.1 should be directly provided and specified in the guide. Due to the repetitive character of the comment only specific cases are outlined separately (as example could be used also a preambles before paragraph 3.15, 5.131).			X	Will be discussed with the editor for consistency with other Safety Guides

COMMENTS BY REVIEWER Reviewer: Country/Organization: PGE EJ1 / Poland			Date: 2017-04-05	RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		"The following recommendations provide guidance to fulfil the ~~overarching~~ design requirements 21, 22, 23, 24, 25, 26, 29 and 30 of [2] related to safety systems and SSCs important to safety." Preamble before paragraph 3.119: "The following recommendations provide guidance to fulfil the ~~requirement 4.15 of the~~ ~~overarching~~ requirement's 9 of [2] specific requirement 4.15 regarding national and international nuclear industry codes and standards identification and usage." Preamble before paragraph 4.25: "The following recommendations provide guidance to ~~ensure that~~ fulfil the Requirement 51 of [2] regarding residual heat removal from the reactor core and supplement the generic recommendations indicated in section 3."	The rest preambles with reference to SSR-2/1 Rev.1 should be supplemented in a similar way before following paragraphs: 3.11, 3.30, 3.32, 3.38, 3.40, 3.50, 3.54, 3.59, 3.78, 3.84, 3.100, 3.113, 3.119, 4.19, 4.25, 5.1, 5.14, 5.23, 5.35, 5.39, 5.113, 5.125, 5.159, 5.163, 5.171, 6.1, 6.11, 6.14, 6.24, 6.25, 6.78 Also, in case if reference is provided to specific item of general requirement of SSR-2/1 Rev.1 it is recommended to unify such references and in entire guide to refer to such items as "specific requirements" (see proposed preambles before paragraphs 3.11, 3.119).				
5.	**General comment** Entire document	Replace the term "item" with the general term "SSCs" in the following paragraphs: 3.11, 3.54, 3.112, 4.14, 4.17, 5.15, 5.28, 5.71, 6.12, 6.19, 6.66, 7.50, 7.63, 7.64, 7.75	Different terms are used in the guide to describe the same object of consideration: *"items important to safety", "SSCs important to safety"* also *"items related to safety", "safety-related SSCs"*.	X			

COMMENTS BY REVIEWER Reviewer: Country/Organization: PGE EJ1 / Poland			Date: 2017-04-05	RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			According to IAEA Safety Glossary 2016 edition the term SSCs is equivalent to the term "items" and in the context of safety items should be understood as SSCs: Taking into account, that term SSC as well as various combinations of structures, components and systems are widely used in the entire document, for the guide text harmonization it is recommended to replace the term "items" with the general term "SSCs" (or term "components" if only components are considered) in the indicated paragraphs.				
6.	**General comment** Entire document	The references to "codes and standards" should be unified and harmonized in the entire guide. It is proposed to use *"nuclear industry codes and standards"* The following paragraphs should be harmonized: 3.14, 3.21, 3.71, 3.72, 3.78, 3.92, 3.95, 3.97, 3.98, 3.119, 3.120, 4.41, 5.1, 5.3, 5.24, 5.56, 5.59, 5.84, 5.140, 5.153, 5.161, 5.168, 5.176, 6 (preamble), 6.4, 6.7, 6.8, 6.13, 6.15, 6.48, 6.49, 6.51, 6.59, 6.72, 6.89, 7.2,	There are many references to the nuclear industry codes and standards in the guide. As well as many different forms are used in the guide, including single reference to code: *"design and construction codes and standards"*, *"codes and standards internationally recognized"*, *"applicable proven codes and standards"*, *"applicable nuclear codes and standards"*, *"widely accepted codes and standards"*,				

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		7.16, 7.23, 7.43, 7.72, 7.79, 7.185	*"national and international codes and standards widely used by the nuclear industry"*, *"highest standards defined by the industry for nuclear application"*, *"latest edition of established codes and safety standards"*, etc. It is recommended to unify and harmonize the entire guide text and use one and the same form when referring to nuclear industry codes and standards.				
7.	**General comment** Entire document	The clarification of "design" object of consideration should be added in the following paragraphs: 3.27 "engineering rules that are used for design [of what?]", 3.34 "uncertainties to be considered in design [of what?]", 3.44 "the effects of hazards considered for design [of what?]", 3.68 "to establish confidence in the robustness of the design [of what?] and margins [which?]", 3.84 "The design [of what?] should incorporate provisions", Similar in the rest of paragraphs: 3.87, 3.90, 3.92 (5th dot), 3.119 (1st and 3rd dot), 3.122, 4.5, 4.20, 5.3,	There are many times "design" mentioned in the guide. In most cases the object which design is under consideration is specified: "design of RCSASs", design of UHS", "design of plant", "design of SSCs", etc. but in some cases the object of consideration is not specified. It should be noted, that it is impossible to guess which design is considered when object of consideration is not mentioned or specified. The proper clarification regarding design object should be provided in each paragraph where design of something not defined is considered. It should be noted that in general				

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		5.66, 5.80, 5.81, 5.130, 5.165, 6.1 (1st dot), 6.4, 6.7, 6.42, 6.64, 6.76, 6.88, 7.26, 7.27, 7.30, 7.31, 7.32, 7.37, 7.41, 7.44, 7.46, 7.49, 7.79, 7.82, 7.111, 7.114, 7.131, 7.158, 7.160, 7.167, 7.170	entire guide is written without consideration if the guide user will be able to understand what author had on his mind. As of that there is a risk of misunderstanding or wrong interpretation of recommendations what should be avoided in nuclear safety related documentation.				
8.	Para 3.2 page 10	"The design of RCSASs should be conducted taking into account design recommendations for nuclear safety and nuclear security in an integrated manner in such way that nuclear safety and nuclear security measures do not compromise each other. Recommendations for nuclear security are detailed in [4]."	Editorial remark. It is recommended to use terms "nuclear safety" and "nuclear security" in such level document as the guide.	X See 3.4			
9.	Para 3.11 page 11	"The screening process used for identifying internal hazards should be documented in accordance with a ~~quality assurance~~ management system process. ~~Items~~ SSCs important to safety for a safe shutdown of the reactor and for the mitigation of the accident conditions should be protected against the effects of internal hazards. That protection should also consider the consequences of the effects of the failures of nonprotected ~~items~~ SSCs on protected ~~items~~ SSCs."	1. "Quality assurance" is outdated term and should be replaced by new term "Management system". According to IAEA Safety Glossary 2016 edition: *"The terms quality management and management system have been adopted in the revised standards in place of the terms quality assurance and quality assurance programme"*. 2. Editorial remark (see general comment 5).	X			

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
10.	Para 3.12 page 11	Protection and layout [of what?] should be adequate to ensure that the modelling of the system [which?] response described in the analysis is not compromised by the effects of the PIE.	1. It is not clear which protection and which layout is considered here. The clarification should be provided in the guide. 2. It is not clear which system is considered here. The clarification should be provided in the guide.			X	See 3.15 Clear (the systems credited in the analyses) for layout, protection and the modelling
11.	Para 3.13 page 11	Protection [against what?] of the safety systems should be adequate to give evidence that an internal hazard cannot be a PIE for common cause failure for the total loss of the function to be accomplished by the safety system.	Hardly understandable paragraph. 1. It is not clear which protection (protection against what) is considered here. The clarification should be provided in the guide. 2. It is not understandable how internal hazard can or cannot be a common cause failure. It seems that here was intention to state that internal hazard cannot cause a CCF or be a PIE for CCF.		Safety system		See 3.16
12.	Para 3.16 page 12	With regard to the effects of external hazards, ~~physical protection~~ nuclear security should be applied to the extent possible to prevent damage to RCSASs. ~~Physical protection~~ The RCSASs protection from external hazards can rely on an adequate layout ~~and physical protection~~ of the	Editorial remark. 1. "Physical protection" is outdated term and should be replaced by new term "Nuclear security". 2. Hardly understandable part: *"Physical protection can rely on… physical protection"*			X	Nuclear security is not addressed in this safety guide 3.19 is specific for external hazards, so the text is clear enough.

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		buildings and nuclear security measures at the site. When ~~physical protection~~ nuclear security is not effective against specific external hazards SSCs should be designed to withstand the external hazard loads and their combinations.					See 3.19
13.	Para 3.18 page 12	"For each relevant external hazard or likely combinations of hazards, components whose operability or integrity is required during or after the hazard induced event should be identified…"	Editorial remark. Hazard is an indication what can happen to NPP. Risk of external hazard with one or other probability exist always and as of that cannot pass. But hazard induced event have certain time frame. Should be – after hazard induced event.	X			See 3.21
14.	Para 3.20 page 12	"…Irrespective of the safety class to which SSCs are assigned, safety systems and safety features [?] for accidents without significant core degradation should be designed to withstand SL-2 [?] seismic loads"	1. The meaning of "safety features" is not clear or understandable. The IAEA Safety Glossary 2016 edition does not provide definition of "safety features" so this involves some confusion with respect to the meaning of other related terms such as safety systems and engineered safety features. The definition and clarification of "safety features" should be provided in the guide. 2. It is not clear if SL-2 seismic load		X		See new 3.22 SL-2 as defined in the IAEA Safety Standards

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			should be understood as "maximum design earthquake". The definition, clarification and specification of what is SL-2 seismic load should be provided in the guide.				
15.	Para 3.22 page 12	RCSASs ultimately necessary actions to avoid an early or a large radioactive release (if any) should be identified. Integrity and operability (where relevant) of those systems [which?] should be preserved in case of natural external hazards causing loads exceeding those resulting from the site external hazard evaluation. Boundary conditions for the design or assessment [of what?] should be justified.	1. Hardly understandable sentence. Seems word "action" is skipped (see paragraph 3.23 about "actions necessary"). 2. It is not clear which systems are considered here. The clarification should be provided in the guide. 3. It is not clear design or assessment of boundary conditions for what. The clarification should be provided in the guide.		X		See 3.24
16.	Para 3.23 page 13	"In the event of external hazards, short term actions necessary to preserve the reactor coolant pressure boundary (RCPB) integrity and to prevent accident conditions [which conditions?] from escalating to the DEC with core melting ~~conditions~~ should be accomplished by systems available at the site…"	It is not clear which conditions should be prevented to escalating to core melting conditions – accident, AOO, DBC or DEC without core melting? The clarification should be provided in the guide.			X	To prevent plant conditions from escalating to…
17.	Para 3.26 page 13	"Accident conditions should be used as inputs for determining	It is not clear which capabilities and which loads to what.				

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		capabilities, [which?] loads [which loads to what?] and environmental conditions in the design of the RCSASs…"	The clarification should be provided in the guide.				Recommendation is clear: Capabilities, loads, environmental conditions to be specified for the design of the RCSASs should be derived from calculations of the conditions prevailing in the RCS in accident conditions
18.	Para 3.27 page 13	"Computer codes and engineering rules that are used for design [of what?] should be documented, validated and, in the case of new codes, developed according to up to date knowledge and recognized standards for ~~quality assurance~~ management system. Users of the computer codes should be qualified…"	1. It is not clear which design is considered here. The clarification should be provided in the guide (see also general comment 7). 2. "Quality assurance" is outdated term and should be replaced by new term "Management system". 3. It should be clarified which codes are considered here in order to not mismatch with "codes and standards".			X	See 3.30 Recommendation is clear: Design of items addressed in this Safety Guide
19.	Para 3.27 page 14	"…and the single failure which has the largest impact…"	Mistype in word "failurewhich".	X			See 3.35
20.	Para 3.37	"…to remove residual heat from the	It is not clear what should be		X		See 3.39

COMMENTS BY REVIEWER Reviewer: Country/Organization: PGE EJ1 / Poland			Date: 2017-04-05	RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
	page 15	core and transfer residual heat to the ultimate heat should be conducted to identify ~~relevant possibilities for~~ potential sequences of failures which may arose to DECs."	understood as "relevant possibilities for DECs". Proper clarification should be provided in the guide.		"candidates"		
31.	Para 3.40 page 16	"The following factors should be considered to achieve the adequate reliability of the RCSAS… and to transfer residual heat to the ultimate heat sink: • Safety classification and the associated engineered requirements for design and manufacturing [of what?]; … • Prevention of common cause failures by implementation of suitable ~~defensive~~ protective measures such as diversity, physical separation, functional independence; • Layout [which?] provisions to protect the system against the effects of internal and external hazards; • Periodic testing and inspection [of what?]; • Aging [of what?]; • Maintenance [of what?]; • Use of equipment designed to fail-	The information provided in this paragraph is unclear and not comprehensive. Proper clarification should be provided. 1. Design and manufacturing of what? Also, it is unclear if associated engineered requirements for design and manufacturing should be understood as nuclear industry codes and standards (see paragraph 4.41). 2. Which layout? 3. Periodic testing and inspection of what? 4. Ageing of what? 5. Maintenance of what? 6. It is unclear what is meant by *"fail-in a safe mode"* and when the equipment should fail-in a safe mode?			X	See 3.47 Recommendation is clear: This bullet list refers to RCSAS necessary to control reactivity of the core, to maintain sufficient inventory in the reactor coolant system, to remove residual heat from the core and to transfer residual heat to the ultimate heat sink:

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		in a safe mode [to switch, to transit, to convert?].					
32.	Para 3.41 page 16	"…Additionally, unavailability [of what?] for maintenance or repair should be considered."	It is not clear "unavailability" of what. The clarification should be provided in the guide.			X	See 3.48 Recommendation is clear: To systems required to shutting down the reactor, cooling of the core, control of the core reactivity, residual heat removal and transfer to the ultimate heat sink in the event of design basis accidents
33.	Para 3.47 page 17	"~~The more likely~~ Potential combinations of PIEs and common cause failure (CCF) between the redundancies of the safety systems should be analysed… The additional ~~features~~ SSCs for residual heat removal and heat transfer to the ultimate heat sink should be designed and installed…"	Editorial remark. Usage of term "additional features" is unclear in this context. It is unclear if this "additional features" should be understood as "additional safety features" mentioned in next paragraph 3.48 or not (it should be noted, that the term "safety features" is unclear by itself (see comment 14)). Proper clarification of "additional features" should be provided in the			X	See 3.54 "The more likely combinations.." is here important

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			guide or term "features" replaced by SSCs.				
34.	Para 3.49 page 17	"Similar recommendations as indicated for systems designed to mitigate design basis accidents should be applied for systems designed to mitigate DEC without significant fuel degradation, taking into account that meeting the single failure criterion is not required…"	Editorial remark. The proper clarification should be provided to what object of consideration similar recommendation should be applied.			X	See the sub tittle :… design extension conditions without significant fuel degradation:
35.	Para 3.51 page 18	"Vulnerabilities for CCF between ~~those items~~ alternative means to shut down the reactor should be identified and the consequences of CCF assessed. The vulnerabilities for CCF should be removed to the extent possible where escalation to core melt accident would be the consequence of CCF."	Proper clarification should be provided regarding: 1. which items are under consideration, 2. what consequences and for what should be assessed.	X			See 3.54
36.	Para 3.52 page 18	"Independence implemented between systems [which?] should not be compromised by CCF in I&C systems or other support systems…"	It is not clear independence between which system should not be compromised. The clarification should be provided in the guide.	X			See 3.54 Recommendation is provided with less details
37.	Para 3.54 page 18	"Consequences of a SSC failure should be considered both on the accomplishment of the function [which?], and on the level of the radioactive release. For ~~items~~ SSCs	The information provided in the paragraph is unclear. Proper clarification should be provided:				See 3.63 Recommendation is clear (to SSC) and reference to SSG-30 is indicated for

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		for which both effects are relevant… For ~~items~~ SSCs which do not contain radioactive materials the safety class and the quality requirements are directly derived from the consequences [which?] assuming that the function [which?] is not accomplished."	1. which function should be accomplished, 2. the quality requirements should be directly derived from which consequences.				details
38.	Para 3.55 page 18	"The classification should be established in a consistent manner such that all systems necessary for the accomplishment of a single function are assigned in the same class or justification [of what?] should be provided."	It is not clear justification of what should be provided. The clarification should be provided in the guide.			X	See 3.64 Recommendation is clear: If the class is different
39.	Para 3.57 page 18	"The application [for what?] to RCSASs is indicated in sections 5, 6 and 7."	It is not clear what kind of application is considered here The clarification should be provided in the guide.				Deleted
40.	Para 3.58 page 18	"More detailed guidance [regarding what?] is given in the Safety Guide SSG-30 [10]."	It is not clear detailed guidance regarding what or for what is referred here. The clarification should be provided in the guide.		See 3.62		
41.	Para 3.60 page 19	"The relevant environmental conditions… synergistic effects, and margins [which?] should all be taken into consideration in the environmental [whose?] qualification	1. It is not clear which margins are considered here (also in paragraph 3.62). The clarification should be provided			X	See 3.71 Recommendation is clear: the qualification of SSC should include

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		[11].”	in the guide. 2. It should be clarified whose environmental qualification is considered here (also in subsequent paragraphs 3.61, 3.62, etc.).				margins with regard to the expected environmental conditions
42.	Para 3.63 page 19	“Techniques to accelerate the testing for ageing [of what?] and environmental qualification can be used, provided that there is an adequate justification [of what?].”	1. It is not clear whose ageing should be tested. The clarification should be provided in the guide. 2. It is not clear whose justification and for what purpose should be provided here. The clarification should be provided in the guide. 3. It should be used full title “environmental qualification” here and in the following paragraphs 3.64, 3.65			X	3.72 Clear (in general)
43.	Para 3.63 page 19	“~~Documented evidence~~ The results of [whose?] environmental qualification, the applicable parameters and the established qualification needs [for what?] should be ~~contained~~ documented and included in or referenced by applicable design documentation…”	1. Editorial remark. 2. It should be clarified whose environmental qualification is considered here. 3. The part with “qualification needs” is unclear. Proper clarification should be provided regarding those “qualification needs”.		X		3.75
44.	Para 3.71	“Design basis loading conditions	The meaning of “Upset conditions” is			X	Correct terminology

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	and note 2 page 20	should be assigned in different categories (e.g. Normal service conditions, ~~Upset~~ Abnormal [AOO] conditions, Emergency conditions, Faulted conditions) according to their estimated frequency of occurrence[2] or according to requirements of accepted nuclear industry codes and standards and regulations. [2] • Normal service conditions: loading conditions to which the equipment may be subjected during in the course of normal operation including normal operating transients and start up/shutdown conditions; • ~~Upset~~ Abnormal conditions: loading conditions to which the equipment may be subjected during transients resulting from the occurrence of a PIE categorized as an AOO;	unclear. The IAEA Safety Glossary 2016 edition does not provide definition of "Upset conditions". Instead "Abnormal conditions" is defined as AOO. It should be noted, that in other paragraphs (see for example paragraph 3.114 and 4.3) the terms "abnormal condition" and AOO is used.				for loads
45.	Para 3.72 page 21	"The appropriate stress levels to be met for integrity [of what?] should be defined ~~and be appropriate to~~ for each load combination with due account taken of the load combination category… Meeting the criteria given by internationally recognized nuclear industry codes and standards ~~internationally recognized~~ provides reasonable assurance that structures and	1. It is not clear whose integrity is considered here. The clarification should be provided in the guide. 2. See general comment 6.			X	3.80 Clear (in general)

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		components are capable of performing their intended functions".					
46.	Para 3.73 page 21	"When operability [of what?] needs to be demonstrated at specific environmental conditions, additional analyses of stress loads or tests should be conducted by applying the relevant stress limits."	Editorial remark.			X	3.81 Demonstration of operability may need tests or additional analyses
47.	Para 3.74 page 21	"Normal service and ~~upset~~ anticipated operational [abnormal?] conditions should be defined by modelling the plant response under realistic conditions."	Editorial remark. The meaning of the term "upset conditions" is unclear. The IAEA Safety Glossary 2016 edition does not provide definition of "Upset conditions". Instead "Abnormal conditions" is defined as AOO (see comment 44).			X	3.82 is correct
48.	Para 3.81 page 22	"Materials should be highly resistant to all the corrosion phenomena in operating conditions including any deterioration from chemical ~~attack~~ impact by the fluid and abrasive effects…"	Editorial remark. Meaning of "chemical attack" is unclear in this context and should be replaced by one of the following term: "impact", "influence", "interaction", "effect".		X Corrosion		See 3.92
49.	Para 3.84 page 23	"The design [of what?] should incorporate provisions to facilitate in service inspection, maintenance, repair and modifications to be carried out during the construction and commissioning phases ~~should be~~	Hardly understandable sentence. End of sentence does not fit and comply with the beginning of sentence. Not clear why provisions for inspection, maintenance repair and modification should be considered			X	Clear (in general)

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		~~identified~~."	only in construction and commissioning phases. Inspection, maintenance repair and modification should be considered in operation phase as well. Proper clarification should be added to the guide.				
50.	Para 3.88 page 23	"If the plant design contains safety equipment that cannot be tested ~~in situ~~ in place after installation (e.g. explosively actuated valves) an appropriate surveillance program should be implemented that includes pre-service and in-service provisions [for what?]."	1. Editorial remark. Meaning of "in situ" is not clear in this context. 2. It is not clear "pre-service and in-service provisions" for what should be implemented. Also it is recommended to unify the usage of terms "pre-service" and "in-service" as now various forms appear in the guide text like "preservice", "Pre service", "in service", etc.				Clear (in general)
51.	Para 3.90 page 23	"The design [of what?] should allow access to any part of the RCS that has to be inspected during the plant life time, in particular welds. Specific areas subject to cyclic loads should be identified at design stage and specifically monitored in order to confirm that no damage [to what?] occurs due to fatigue."	It is not clear design of what should allow access as well as not clear damage to what. Proper clarification should be provided.				See 3.107 Clear (in general)
52.	Para 3.98	"The same nuclear industry code and	1. Editorial remark.			X	3.119 Clear (in

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	page 25	standard should be used for the design, manufacturing and overpressure analysis of a given component [of what?]."	(see also general comment 6.) 2. It should be clarified component of what structure is considered here.				general)
53.	Para 3.104 page 26	"They should be examined periodically throughout the plant lifetime to monitor changes in physical properties [of what?] (in particular ductility and toughness) and to enable predictions…"	It is not clear whose physical properties should be monitored. Proper clarification should be provided.			X	All if considered as relevant
54.	Para 3.107 page 27	"~~A measurement~~ Detectors should be installed to detect accumulation of combustible (radiolysis) gases [where?]."	1. Editorial remark. Measurement is an action and can't be installed. Sensors [detectors] should be installed to measure and detect accumulation of combustible (radiolysis) gases. 2. Proper clarification should be provided regarding where combustible (radiolysis) gases can accumulate and where it should be detected.				Clear (in general)
55.	Para 3.115 page 28	"…The following recommendations should be implemented to the extent possible: • ~~Not sharing~~ sensors for the automatic actuation of the ~~operation of~~ the safety systems should be separated from the sensors for ~~and~~ the accident monitoring of the plant; • ~~Not sharing the same~~ sensors for	Editorial remark. Hardly understandable text. Also see the comment 14 regarding "safety features".			X	3.134 Not sharing is also correct

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		the automatic actuation of the reactor shut-down or ~~of the operation~~ of the safety systems, ~~and~~ should be separated from the sensors for the actuation of the safety features…"					
56.	Para 3.120 page 29	"… • ~~Quality assurance~~ Management system; …"	Editorial remark. "Quality assurance" is outdated term and should be replaced by "Management system".	X			3.141
57.	Para 4.2 page 30	"UHS capacity should be adequate to absorb decay heat from the different reactors and spent fuel pools at the site. ~~This~~ UHS capacity (natural or supplemented by associated structures) should be ~~designed~~ enough to provide absorption of residual heat discharges considering that several or even all units could be in accident conditions simultaneously"	Editorial remark. If natural (water, air) UHS is used, its capacity cannot be designed, it is what it is. Also, it should be noted, that paragraphs 4.4 1st dot in general repeats paragraphs 4.2 recommendation, that implies the need for better text optimization, for example by joining paragraphs.			X	4..4 is correct
58.	Para 4.5 page 31	"To fulfil the design objectives in terms of UHS capacity and reliability and to comply with the Defence in depth concept (Requirements 53, ~~item~~ specific requirement 6.19A [2]), different UHS and different accesses to the UHS might be implemented."	Editorial remark. The reference to SSR-2/1 Rev.1 should be provided by referring to the list of references at the end of the guide.				Will be fixed with the editor
59.	Para 4.6 page 31	"UHS associated heat transfer and support systems should be designed	UHS is water or atmosphere and as of that cannot be designed.		X Structures associated to		See 4.8

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		to withstand the loads caused by the site hazards derived from the site hazard evaluation. Recommendations and guidance on the consideration of external events in the design of the ultimate heat sink associated heat transfer and support systems …"	Instead UHS associated heat transfer and support systems should be designed (good example is paragraph 4.14). It should be noted, that same remark is applicable everywhere where designing of UHS capacity or capability is mentioned in the guide, in particular in paragraph: 4.12				
60.	Para 4.17 page 32	"The heat rejected from ~~items~~ SSCs important to safety, operation of which is necessary to achieve and maintain safe plant shut down or to cope with post-accident conditions should be identified and taken into account in determining the capabilities of UHS and associated heat transfer systems."	1. The sentence of paragraph 4.17 is not finished. The proper ending of sentence should be provided. 2. See general comment 5.				This recommendation was deleted (repetition)
61.	Para 4.18 page 33	"If potential metal– water reactions are determined to be significant as an additional heat source, then they should be quantified as a function of time and included in the sizing criteria."	It is not clear what does it mean "sizing criteria" in this context. Proper clarification should be provided in the guide.			X	Clear
62.	Para 4.25 page 34	"Systems [which?] should be designed to transfer all heat [which kind?] loads generated for controlling primary coolant temperature…"	1. The clarification of which systems should be designed should be provided. 2. The clarification of which kind of heat is under consideration – residual heat, spent fuel decay heat, or heat			X	Clear Systems to perform

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			under operation condition (see paragraph 5.97) should be provided in all paragraphs where heat transfer is mentioned, in particular 4.25-4.32; 4.37-4.40, 6.79-6.81, etc.				Residual heat transfer in operational states
63.	Para 4.32 page 34	"Residual heat transfer systems should be designed… to transfer residual heat after a design basis accident (see paragraph [which?] Residual heat transfer in accident conditions)."	The reference is unclear. The paragraph number is not provided, there is no such paragraph with provided title in the guide. This is good example why paragraphs (rather sections and subsections) should have their own lower level numbering. Proper numbering of sections and subsections would make it easier to find the referred link. Now all the guide is written without proper division of the text to numbered subsections.		X		See 4.35
64.	Para 4.42 page 36	"A failure on a lower classified ~~part~~ component [SSC?] would not cause the failure of a higher classified ~~part~~ component [SSC?] and the isolation devices should have a safety class similar to the highest ~~one~~ safety class of the component they isolate."	Editorial remark. "Part" should be replaced by "component", "element" or SSC in general.				Deleted
65.	Para 4.42 page 36	"Conditions [DEC?] requiring additional needs (safety features for DECs) are reactor technology/ design dependent, and they should be postulated applying a deterministic	1. It is not clear which conditions require additional needs and what does it mean "additional needs" in context of residual heat transfer.				See .44

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		approach in combination with PSA level 1. In particular (see recommendation 3.36 [?])"	2. The reference to paragraph 3.36 is unclear. Seems this might be a reference to different document. Proper clarification or correction should be provided in the guide.				
66.	Para 5.6 page 38	"…Where such materials are used for t [what?] manufacturing…"	It is not clear what is "t" and how it can be manufactured. Proper clarification should be provided in the guide.			X	See new section 5 See 5.10
67.	Para 5.10 page 38	"Stresses caused by normal service and ~~upset~~ abnormal [AOO] conditions should be less than the stress limits specified for those loading conditions categories. Moreover, the design [whose design?] pressure and temperature should not be exceeded, and the cumulative usage factor should be less than 1."	1. The meaning of "Upset conditions" is unclear. The IAEA Safety Glossary 2016 edition does not provide definition of "Upset conditions". Instead "Abnormal conditions" is defined as AOO (see comments 44 and 47). 2. The clarification and explanation of the "cumulative usage factor" meaning as well as the physical meaning of its value less than 1 and equal to 1 should be provided in the guide.			X	See justification for similar comments
68.	Para 5.12 page 39	"For these loading conditions assigned in ~~faulted~~ abnormal [AOO] conditions category, the design criteria should aim at preserving the integrity of the equipment… Pressure reached during an ~~faulted~~ abnormal [AOO] condition may exceed the	The meaning of "faulted conditions" is unclear. The IAEA Safety Glossary 2016 edition does not provide definition of "faulted conditions". Instead "Abnormal conditions" is defined as			X	Idem

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		design pressure…"	AOO.				
69.	Para 5.13 page 39	"…This monitoring should prove that the number of occurrences allowed for each plant situation is not exceeded during the plant life time, as specified in 4.7 [?], and there is minimal risk of cracking induced by fatigue."	Unclear reference. Paragraph 4.7 is nor related with the number of occurrences. Seems this might be a reference to different document. Proper clarification or correction should be provided in the guide.	X 5.*			See 5.14
70.	Para 5.16 page 39	"…According to this concept, systems and components with different capacities [of what?] should be used for pressure control to ensure that counter measures [which?] are proportional to the severity of an anticipated operational occurrence or accident."	1. It is not clear what capacity of systems and components are considered here. 2. It is not clear what counter measures are considered here. Proper clarification should be provided in the guide.			X	See 5.19 Clear
71.	Para 5.24 page 40	"The steam [steam-water mixture, water?] discharge capacity by the safety valves [?] should be designed to meet the pressure limits prescribed by the nuclear industry codes and standards and applying design rules specified by the code. … • The total discharge capacity of the safety valves [?] credited in the analysis is calculated taking into account the sequential opening of the	It is not clear whose discharge capacity and discharge of what is considered here. It is not clear if the object of consideration in this paragraph is the same as in paragraph 5.32. Proper clarification should be provided in the guide. The object of discharge – *"steam as well as a steam-water mixture and water"* should be mentioned at the beginning of subsection in the paragraph 5.16 (see comment 70 above)			X	See 5.30 Correct

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		safety valves…"					
72.	Para 5.36 page 42	"…That function should be accomplished by the operation of dedicated discharge valve(s) designed with a large [steam, steam-water mixture, water?] discharge capacity…"	It is not clear discharge of what is considered here. Proper clarification should be provided in the guide.				See 6.91
73.	Para 5.37 page 42	"Spurious opening of discharge valves [?] of that system [which system?] should be prevented and its frequency [frequency of what?] should not be higher than the frequency considered for loss of coolant accidents."	1. It is not clear opening of what and which system is considered here. 2. It is not clear frequency of what. Proper clarification should be provided in the guide.		X		See 5.38
74.	Para 5.46 page 43	"…loads defined for normal operation should be identified and primarily categorized in a plant state category on the basis of its frequency to occur (see paragraph 3.4 [?])."	Unclear, improper reference. Paragraph 3.4 is not related with loads categorization. Seems this might be a reference to different document. Proper clarification or correction should be provided in the guide.	X			See 5.52 Cross reference is deleted
75.	Para 5.55 page 44	"… Delta T [?] max between hot leg and pressurizer; • Delta P [?] max Primary/ Secondary; • Max RCS leak rate; • Max RCS/SG [?] leak rate;	1. Unclear, improper abbreviation. The abbreviation "Delta T", "Delta P" should not be used without proper definition of them at first or should not be used at all in this particular case. 2. It is not clear which limits are considered here.			X	Will be fixed with the editor Technically speaking the bullets are clear

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		• Limits [which?] regarding the brittle fracture of RPV; • Component parameters (e.g. Delta P [?] for reactor coolant pump seals, T [?] seals)."	Proper clarification and definition should be provided in the guide. 3. It is not clear if "RCS/SG leak" means leak from Primary boundary [RCS] to steam generator [SG]. The clearly understandable direction of the leak should be indicated in the guide.				
76.	Para 5.59 page 46	"Hydrostatic pressure test of the RCS should be performed at commissioning stage and repeated periodically, with possibly different criteria [which criteria?]…	It is not clear which criteria or criteria of what should be changed for pressure tests. Also the frequency of periodical test is not unclear, should it be once a year, every maintenance outage or should it be once in 10 years. Proper clarification should be provided in the guide.			X	Acceptance criteria defined for the test
77.	Para 5.72 page 46	"Correct operation of pads and bearings should be monitored and automatic ~~stop~~ tripping of RCS pumps should be implemented"	Editorial remark. See paragraph 5.73: *"RCP should be automatically tripped in any case"*	X			
78.	Para 5.141 page 56	"…isolation devices should be designed to open quickly and without external service (e.g. check valves ~~are~~ widely used ~~by Member States~~ in modern nuclear industry)…"	Editorial remark. The referring to "Member States" is unclear in this context. It is not clear which membership is considered here (IAEA, OECD, EU, etc.). Besides, check valves are widely used not by something that is called "State", but by particular nuclear		X ~~Member states~~		See 6.60

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			facilities operators or nuclear industry in general.				
79.	Para 5.150 page 57	"…RHR operation with adequate margins (24 hour autonomy is generally considered ~~by Member States~~ as a minimum by modern nuclear industry practice).	Editorial remark (see 78 comment above). The referring to "Member States" is unclear in this context. It is not clear which membership is considered here (IAEA, OECD, EU, etc.).		X ~~Member states~~		6.71
80.	Para 5.159 page 58	"This system [which?] should be designed according to…"	It is not clear which system is considered here. Proper clarification should be provided in the guide. It should be noted, that similar expression form: "this system", "that system", etc. is widely used in the guide without the specification of the system itself. Same comment applies for the following paragraphs: 5.160, preamble before 5.171, 5.171-5.174.			X	Clear The system designed Residual heat removal in the long term of design basis accidents
81.	Para 5.163 page 59	"… • Extend EFW autonomy with on-site refilling [refilling of what?] capabilities; …"	It is not clear refilling of what and by what medium is considered here. Proper clarification should be provided in the guide.			X	Clear With water
82.	Para 5.175 page 61	"Acid boric concentration should be sufficient to compensate for the	Editorial remark.	X			See 6.102

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		moderator reactivity effect variation during the RCS cooling."					
83.	Preamble before Para 6.1 page 61	"…the consequences of such failure may not be reasonably limited (see paragraph [?] section3)."	The reference to paragraph is not provided. The number of paragraph from section 3 should be provided.				Removed
84.	Para 6.3 page 62	"These RCS situations should be formally identified at the design stage in order to be monitored during the plant operation, and a number of allowed occurrences [of what?] should be assigned to each of them [whom?], according to usage factor [?] assessment of each component."	1. It is not clear what "allowed occurrences" are considered here. If it is cyclic loads occurrences, it should be clearly stated. 2. It is not clear what is considered as "them". Proper clarification should be provided. 3. The meaning of "usage factor" is not clear. Proper clarification and definition of "usage factor" should be provided in the guide.		X and a number of occurrences should be assigned to each of them according to the usage factor assessment of each component		See 5.8
85.	Para 6.7 page 63	"Provisions to ensure that the components [which?] can be fully inspected during the life of the component should be addressed during the design. The design, requirements must be fulfilled during the manufacturing of RCS components. Following initial manufacture [of what?], a hydrostatic test in accordance with recognized nuclear industry codes and standards	It is not clear which components or which components design and manufacture are considered here. Proper clarification should be provided in the guide. Also see general comment 6.			X	See 3.106-3.114

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		requirements should be performed prior to installation [of what?] in the plant."					
86.	Para 6.14 page 64	"…The settings [which?] should be ~~designed~~ set [applied] on the basis of a sequential opening…"	Editorial remark. The settings cannot be designed, they can be set on the basis of analysis. Also it is not clear which settings are considered here. Proper clarification should be provided in the guide. Good example how it might be written is paragraph 7.74: *"The setting of the safety valves should be such that safety valves open in sequence…"*	X			See 5.27
87.	Para 6.29 page 67	"…RCS components and hence should be designed and manufactured in compliance with the requirements and recommendations [?] that apply to RCS components."	It is not clear what should be understand by "requirements and recommendations that apply to RCS components" and if it is "nuclear industry codes and standards". Proper clarification should be provided in the guide.			X	See 5.50 This recommendation is clear: the relevant requirements are the same as for the RCPB
88.	Para 6.45 page 69	"… • Component parameters (e.g. Core Delta P [?], parameters [which?] for RCS pump seals); …"	It is not clear what "Core Delta P" means. Proper definition or clear text should be provided in the guide (see also related comment 75). Also it is not clear which parameters for RCS pump seals should be	X			See 5.62

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			considered. Proper clarification should be provided in the guide.				
89.	Para 6.47 page 69	"Stresses caused by normal service and ~~upset~~ abnormal [AOO] conditions should be less than the stress limits specified for those loading conditions categories. Moreover, the design pressure and temperature should not be exceeded, and the cumulative usage factor [?] should be less than 1."	1. The meaning of "Upset conditions" is unclear. The IAEA Safety Glossary 2016 edition does not provide definition of "Upset conditions". Instead "Abnormal conditions" is defined as AOO (see comments 44, 47 and 67) 2. The clarification and explanation of the "cumulative usage factor" meaning as well as the physical meaning of its value less than 1 and equal to 1 should be provided in the guide (see comment 67).				See 5.11 This recommendation deals with loads and plant states. Upset emergency, faulted conditions is the right terminology
90.	Para 6.54 page 71	"In order to accommodate level [of what?] changes in the RPV during shut-down and start-up…"	It is not clear, what levels are considered here. Proper clarification should be provided in the guide.		Water level		See 5.69
91.	Para 6.71 page 73	"… • The management of the three main [which?] safety functions and, in particular, the achievement of core cooling; …"	It is not clear which 3 main safety functions are considered here. Proper clarification should be provided and three main functions should be named directly in the in the guide.				Piping is now addressed in 5.119 - 5.122 This recommendation is removed
92.	Preamble before	"Core reactivity control by moving control rods and by controlling of the	It is strange to provide reference to the document where mentioned				It was a mistake

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
	Para 6.75 page 74	recirculation coolant flow rate are not addressed in [18]".	information is not provided. Instead the reference where proper information is provided should be indicated. It should be noted, that preambles before paragraphs 6.98 and 7.84 implies that correct reference might be to [18]: *"The shut-down system relying on the drop of solid absorbers and the reactor regulating system (reactivity control system) are addressed in the Safety Guide [18]."*				See text above 7.1
93.	Para 6.89 page 77	"• Taking into account the role of the emergency cooling of the core in the event of DBAs, system(s) [which?] should be assigned ~~in~~ according SSG-30 [10] to the safety class 1. Individual components [of what?] should be designed and manufactured according to the relevant engineering requirements given by the nuclear industry codes and standards~~.~~ ~~T~~taking into account their own role in the accomplishment of the emergency cooling of the core."	Editorial remark. 1. It is not clear which systems and individual components are under consideration here. Proper clarification should be provided. 2.Reference to SSG-30 [10] should be provided. 3. See general comment 6.		X		See 7.15
94.	Para 7.12 page 80	"The fuel channel assemblies should be designed to meet all applicable requirements for the [whose?] specified design life time.	Editorial remark. The meaning of term "design life" is unclear. Seems it should be "design	X			See 5.84

COMMENTS BY REVIEWER Reviewer: Country/Organization: PGE EJ1 / Poland			Date: 2017-04-05	RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			life time" Also it is not clear whose "specified design life time" is under consideration here and as of that which applicable requirements shall be meet. Proper clarification should be provided in the guide.				
95.	Para 7.18 page 81	"…The axial pull out load should be at least three times the design condition [?] total axial load	The meaning of term "design condition" is not clear. Is it "normal operation condition" or "normal service condition". Does it include AOO, DBA? Proper clarification and definition of term "design condition" should be provided or the term should be corrected accordingly. It should be noted that the IAEA Safety Glossary 2016 edition does not provide definition of "design conditions".			X	See 5.89 Clear
96.	Para 7.64-7.66 page 86	"…expected to be of seismic category 1… should be of seismic category 2…"	The definition and clarification of seismic categories 1 and 2 should be provided in the guide. Also it is not clear how this seismic categories 1 and 2 are related to mentioned previously in the guide seismic load SL-2.				Deleted, see section 3 and 5.55 -5.5.58

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Country/Organization: PGE EJ1 / Poland			Date: 2017-04-05				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
97.	Para 7.73 page 86	"The safety valves, including the relief valves, should be qualified for discharge of steam, water-steam mixture and water at the appropriate reactor condition [?]."	The meaning of "appropriate reactor condition" is not clear. It is not clear if this is "normal operation condition" or "abnormal operation condition". Proper clarification should be provided in the guide.	X			See new 5.37
98.	Para 7.82 page 88	"The design should demonstrate that during crash cool-down: [?]	The meaning of term "crash cool-down" is unclear. The clarification and definition of the term "crash cool-down" should be provided in the guide.			X	Used in the PHWR terminology and it is clear in the text
99.	Para 7.117 page 93	"The first and second reactor shut-down systems (SDS1) and (SDS2) should be passive,…"	Some clarification is needed. No words is said about SDS1 in the guide. It is not clear if SDS1 also is a liquid neutron absorption injection system or is it a solid absorbers rod drop system. Also, does it mean, that in heavy water reactors should not be used active reactor shut-down system? Proper clarification should be provided in the guide regarding SDS1.			X	See 8.44

Slovaquia

COMMENTS BY REVIEWER		RESOLUTION
Reviewer:	Page 1 of 1	

Country/Organization: Slovakia / Nuclear regulatory authority			Date: 16. 3. 2017				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	3.36	Define or specify "very unlikely events"	SSR-2/1 Rev. 1 on Safety of NPPs: Design at various places makes a reference to very unlikely events without quantifying the likelihood. It is proposed that at least safety guides like DS481 may indicate the value (probability) of a very unlikely event		X A foot note is added		See 3.37 Usually probability number is not given in the IAEA Safety Standards, only objective or guidance
2	3.71 comment on 2: PIE categorized as	Define or specify: Postulated initiating events categorized • as an AOO (Anticipated Operational Occurrence); • an accident of low frequency; • an accident of very low frequency	Specify probability or recommendations for determining the probability of a given case. See also wording 5.1		X See foot note of 3.10 for PIEs categorization 5.4 is modified as follows: … High confidence in the design and manufacturing of the large components of RCS should be provided to justify their failure may not be retained as a PIE for the plant design (consequences of such failure cannot be reasonably mitigated)		See new 5.4 Justification by a probability may not be appropriate
3	5.157, 5.158	Explain the SGTR abbreviation	Missing abbreviation See also wording 5.106, 7.129	X			

Switzerland

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:			Page 1of 1				
Country/Organization: Switzerland			Date: 18.5.17				
Comment	Para/Line	Proposed new text	Reason	Accepted	Accepted, but	Rejected	Reason for

No.	No.				modified as follows		modification/rejection
1	Sub-chapter" Safety Classification"(3.54 up to 3.58)	The hole sub-chapter should be deleted	The objective of the referenced safety guide SSG-30 is to provide recommendations and guidance on how to meet the requirements established in SSR-2/1 for the classification of safety important components. There is no need for additional interpretations or recommendations in DS481.			X	A Safety Guide also aims at providing guidance to meet the requirements or at indicating good practices. This guide provide recommendations for the classification of the main SSCs of the RCS and the associated systems. Those recommendations are not detailed in SSG-30.

USA

COMMENTS BY REVIEWER Reviewer: Cynthia Jones, NUSSC Member Country/Organization: USA Date: May 7, 2017				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection

COMMENTS BY REVIEWER Reviewer: Cynthia Jones, NUSSC Member Country/Organization: USA Date: May 7, 2017				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	3.41 Title/Heading	Systems designed to mitigate design basis accidents OR Systems designed to cope with design basis accidents	Mitigate was changed to cope. Mitigate is a more specific and descriptive word. If cope is determined to be the appropriate word then "with" should be added to the title/heading.	X			To cope with
2	4.4/Line 1-3	Short and long term capacity of the UHS should be preferably achieved by the use of inexhaustible natural bodies of water or the atmosphere where access to an inexhaustible supply of water at the site is not available.	Clarify that inexhaustible supply of water is preferred and when that is not available, atmosphere is preferred.	X			
3	4/Ultimate Heat Sink	Delete, "however recommendations given in this section do not extend to those structures and systems."	There are several recommendations for spay ponds and cooling towers throughout Section 4.	X			See 4.2
4	4.4/Bullet 3, Last Sentence	Replace "autonomy" with "safety function"	Clarify meaning.	X			See 4.6

WNA

COMMENTS BY REVIEWER Country/Organization: WNA / CORDEL Date: April 27, 2017 pages				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	2.1, 1st bullet	RCS provides a ~~confinement~~ physical barrier for the protection of plant workers and the public from radioactive material	The term confinement is more typically used for containment or a Reactor Building structure			X	Confinement barrier is more accurate (it refers to one of the three confinement barrier)
2	2.1	Maintain sufficient coolant inventory and cooling conditions to prevent significant fuel damage in design basis accidents and to mitigate the consequences of design extension conditions to the extent **possible**	Statement appears incomplete	X			
3	2.1	**• Control RCS pressure in operational conditions,**	Propose to add a bullet : control of RCS pressure in normal operation can also be performed by RCS (normal spray)			X	Included in " maintain adequate core cooling conditions in operational states"
4	2.5	SYSTEMS FOR HEAT REMOVAL IN **NORMAL** SHUTDOWN ~~MODES~~ **CONDITIONS** 2.5 Those systems are systems designed to remove residual heat from the reactor coolant system during **normal** shutdown ~~modes~~ **conditions**. They include systems designed to cool down RCS to cold shut-down condition including refuelling condition after shutdown for PWR and BWR.	Shutdown modes is not define in the document, nor in IAEA glossary. Proposal to replace by normal shutdown conditions.	X			
5	2.6	…systems designed to compensate FOR leaks …	clarity	X			
6	2.7	2.7 Those systems are systems designed to control the core power distribution in power operation and to control margins to re- criticality in **normal** shutdown ~~modes~~ **conditions**.	Shutdown modes is not define in the document, nor in IAEA glossary. Proposal to replace by normal shutdown conditions.	X			
7	2.8	Those systems are systems designed to remove decay heat from the core, sensible heat, and heat generated from systems in the event of accident ~~	The sensible heat and the heat generated from systems (e.g., RCP's or RHR pump's heat) as well as decay heat shall be removed for safe shutdown.			X	Such details are relevant for section 2 (see section 4 for more details)

8	2.9	2.9 Those systems are systems designed to shut down the reactor ~~**alone**~~, to stop uncontrolled or excessive positive reactivity insertion caused by accident conditions, to limit fuel damage in the event of Anticipated Transients Without Scram (ATWS) and to ensure the core reactivity control until the safe shut-down conditions are reached in accident conditions.	The statement does not clearly express whether the word "alone" applies to each system, or to the systems together, and if they include or not rods. Proposal to remove the word "alone". If needed, a separated statement should be written.	X			
9	2.12	2.12 Capabilities to discharge ~~of~~ residual heat to the ultimate heat sink suppose that one heat sink and one heat transfer chain at least is always available for the different ~~shut-down modes and~~ shut-down condition.	Shutdown modes is not defined in the document, nor in IAEA glossary.	X			
10	3.6	3.6 A design basis should be defined for every structure, system and component and should specify the following: **• The normal operational functions;** • The safety function(s);	Normal operational functions of an SSC are part of its design basis.		The functions to be performed by the SSC		New numbering 3.7
11	3.6	**• loads and load combinations that components must withstand.**	Propose to add a bullet based on recommendation 3.67	X			
12	3.12	~~3.12 Protection and layout should be adequate to ensure that the modelling of the system response described in the analysis is not compromised by the effects of the PIE.~~	Proposal to remove the recommendation : - it does not seem related to Internal Hazards - it does not address design but "modeling", which is not defined.		Modified with "response of the systems…"	X	
13	3.14	Footnote or define "cliff edge effects" as was done in SSR-2-1.	Will ensure consistent terminology			X	A SG aims at elaborating more about the requirements and the definition is in SSrR2/1
14	3.16	3.16 With regard to the effects of external hazards, physical ~~protection~~ **barriers design** should be applied to the extent possible to prevent damage to RCSASs. Physical ~~protection~~ **barriers design** can rely on an adequate layout and ~~physical~~ ~~protection~~ d**esign** of the buildings at the site. When physical ~~protection~~ **barriers** is not effective**,** SSCs should be designed to withstand the hazard loads and their combinations.	"Physical protection" is used regarding protection from malevolent acts, not regarding External hazards.		"physical" is deleted "Protection measures"		New 3.15

15	3.21	~~**Methods, design and construction codes used should provide adequate margins to justify that cliff edge effects would not occur in the event of an increase of the severity of the external hazards.**~~ **The design of the plant shall provide for an adequate margin to protect items important to safety against levels of external hazards to be considered for design, derived from the hazard evaluation for the site, and to avoid cliff edge effects.**	Proposal to replace by the exact wording of SSR-2/1 5.21 rather than paraphrasing it.			X	Se 3.23 The use of "shall "is not recommended in a Safety Guide. The goal is not to request for margin but to explain how the design provides margins.
16	3.24	…be longer than time necessary FOR crediting off-site…	clarity	X			
17	3.27 3.28 3.29	~~3.27 Computer codes and engineering rules that are used for design should be documented, validated and, in the case of new codes, developed according to up to date knowledge and recognized standards for quality assurance. Users of the codes should be qualified and trained with respect to the domain of validation and application and to the assumptions made in the models of the codes .~~ ~~3.28 Calculation of boundary conditions for design basis accidents and design extension conditions should be adequately documented, indicating the relevant assumptions for the evaluation of parameters, the engineering criteria and the computer codes that are used.~~ ~~3.29 Computer codes should not be used beyond their identified and documented domain of validation.~~	These recommendations are not specific to RCSASs. They should be deleted and replaced by adequate references to SSG-2 or DS491 when it is finalized.			X	This recommendation is also applicable to the design activities (not restricted to the assessment of a design.
18	3.30	~~3.30 Design basis accident (DBA) conditions should be identified and calculated for each of the associated systems.~~	Recommendation to be deleted and replaced by adequate reference to SSG-2 or DS491 when it is finalized		Deleted		Included in para. 3.34
19	3.31	…and the single failure which has …	Need space between failure and which.	X			
20	3.32	Mitigation of design extension conditions (DECs) should be accomplished by permanent systems to the extent possible. Typically, such systems should have a lower safety classification than that of the failed system. Short term actions should be implemented by permanent equipment.	Loss of all trains of residual heat removal and total loss of ultimate heat sink require multiple or common cause failures. The design of addition protection layers should have a lower requirement as opposed to being the same level as the failed safety systems			X	Guidance for the classification is addressed in paragraph 3.66

21	3.34	Clarify that this requirement is for systems used to mitigate DECs	This statement could be applied inappropriately	X	For the performances of the RCSASs necessary in DECs, design extension conditions may be calculated with less conservative rules than those used for design basis accidents		See 3.41
22	3.36		To improve clarity this recommendation should be moved before 3.33 (type of DECs to be presented before examples)	X			
23	3.40	Additional text at the end of 3.40 : Since a common cause failure usually of extremely low probability is necessary to impact all redundant trains of a safety function, a diverse means to perform the safety function could be considered with a separate lower tier specifications.	The reason is given by the new proposed text			X	See 3.39
24	3.41	Section title should be "Systems designed to cope WITH design basis accidents"	clarity	X			
25	3.41	…initiating event and single ACTIVE failure…	Active vs passive failures should be addressed.		X		
26	3.41	…unavailability for maintenance or repair should be considered but is not required.	The decision for additional trains of equipment to provide for single failure AND unavailability should be risk based.			X	"should be considered" is appropriate
27	3.43	The on-site AC power source (Emergency Diesel Generator or DC batteries with inverter) should have adequate capability to supply power to electrical equipment operated in DBA conditions …	Some passive plant designs only require DC batteries to perform all of the safety functions. AC power needed for the safety systems is supplied in this case though an inverter. Either add DC Batteries as an option to Emergency Diesel Generators or delete Emergency Diesel Generators				
28	3.67	~~**3.67 The design basis of each component of the RCSASs should include, for each plant state, the loads and load combinations that components must withstand.**~~	Recommendation removed and replaced by addition of a bullet point in 3.6		Emergency Diesel Generator and/or batteries)		3.49
29	3.72	Meeting the criteria given by INTERNATIONALLY RECOGNIZED codes and standards …	Rearrange for clarity	X			

30	3.73 Additional text	When a special stress limit is needed to demonstrate operability, an additional analysis should be conducted. The test to demonstrate operability may be alternative to the analysis.	Clarification		Moved and merged with 3.81		
31	3.84	Delete "should be identified" at the end.	Clarity.	X			
32	3.86	Delete extra period [.] at the end.	Correction.	X			
33	3.88	"pre-service and in-service provisions"	Hyphens needed. Applies to following rest of document, too.	X			
34	3.89a	Methods and criteria provided by relevant national and international codes and standards may be used for Pre service inspection and for In service inspection.	Widely used international practice	X			
35	3.92	In-service inspection	Hyphen needed.	X			
36	3.95	...components subject ~~of~~ to recurrent ultrasonic testing…	Correction	X			
37	3.101	Appropriate design provisions (shielding, remote control valves, etc.) should be implemented to enable local actions required for **accident ~~DBA~~** management without undue radiation exposure of the field operator.	This recommendation should cover DEC. May be limited to DEC without core melt	X			
38	3.103	Content of cobalt, antimony, silver and other easily activated nuclides of all materials in contact with the reactor coolant or directly impacted the neutron flux should be minimized to avoid activation in the core radiation field of entrained corrosion products leading to production of nuclides like cobalt 60, antimony 124, and silver 110.	SSCs not in direct contact with reactor coolant but under neutron flux should be included in the requirement.			X	3.125 Section 3 applies to all RCSAS
39	3.107	As, relevant, a measurement ? FEATURE? should be installed…	A requirement to install measurement instrumentation for combustible gases is not directed to a specific vulnerable area and is impractical in many areas. Design to prevent buildup of combustible gases (e.g. HVAC) may be sufficient provision.		Deleted		
40	3.114	Define MCR and TSC	Clarity	X			
41	3.121		Reference to IAEA requirement 5.76 of SSR-2/1 should be added.	X			
42	4.1	For A site…	Clarity	X			

43	5.3	The following types of failure modes should be considered in the design according to the relevant code requirements, limits, and fatigue evaluation methods: • Excessive plastic deformation; • Elastic or elastoplastic instability (buckling); • Progressive deformation and ratcheting; • Progressive cracking due to mechanical and thermal fatigue;	Widely used international practice			X	The bullets indicate various failure modes
44	5.6	Where such materials are used for ~~t~~manufacturing…	Delete "t"	X			
45	5.47	3rd bullet: "…should NOT propagate to neighboring…"	Correction	X			
46	5.73	"…in order to prevent any further damage TO THE seal system"	Correction	X			
47	5.82	~~All the primary loop piping should be of stainless steel or protected with stainless steel cladding~~	This recommendation is not necessary because 1) not technology neutral and 2) redundant with recommendations in the 'MATERIAL' section (3.78 to 3.83)	X			5.86
48	5.90	2nd bullet: "…steam generated by water contactING the reactor vessel…"	Clarity	X			5.127
49	5.133	"…capabilities to prevent ~~FROM~~ or to limit…"	Clarity	X			
50	5.134	" injection flow rates can BYPASS the core…"	Correction	X			
51	5.136/1	Change the wording, 'sub criticality' to sub-criticality'.	Editorial comment	X			
52	5.137	End with a period, not a comma.	Correction	X			
53	5.139	"…prevent or limit core uncovering taking into ACCOUNT the installed…"	Correction	X			
54	5.147	The minimum net positive suction head (NPSH) for a normal operation of the ECCS pumps should be ensured at any time during DBAs with account taken of limiting phenomena such as vortexing, air entrainment and accumulation of debris at the surface of the sump filters. Accounting for internal containment pressure build-up should be specifically justified if such practice is possibility arises from national regulatory provisions.	What about vortexing and air entrainment? All limiting effects should be considered. Positive effects may also be credited if allowed by national regulatory provisions.	X			6.67
55	5.157	"Isolation of EFW TO the affected SG…"	Correction	X			
56		RHR in the long term discussion: "Such a system ~~TRAIN~~ includes several redundant trains"	Correction	X			6.82
57		RHR in the long term discussion: "it takes suction from RCA and injects water BACK into the RCS after BEING cooled…"	Correction	X			6.82
58	5.163	"…remove residual heat during RCS conditions NOT compatible with …"	Correction	X			6.89

59	5.169	"FOR the RCS fast depressurization…"	Clarity		While the RCS…		6.96
60	5.175	"Acid boric" should be "Boric acid"	Correction				
61	6.9	RCPB integrity should be assured for load combinations of high pressure and low temperature when the reactor coolant system is operated at low temperature, e.g. during pressure test (protection …	Because a BWR operates in a saturated condition, during operation pressure is increased while also heating up. Therefore, low temperature, high pressure conditions are only expected during pressure tests.				Text deleted in the new section 5
62	6.13 3rd bullet	Provisions should be made for normal operational conditions and anticipated operational occurrences by means of systems intended for pressure control to ensure that ~~it will not be necessary to~~ use of Safety Relief Valves (SRVs) in the safety mode is not systematic to limit the pressure increase;	It is recommended to reword statement concerning use of SRVs to indicate that their use should be minimized as opposed to prohibiting their use. For example, during certain events such as an isolation event, it is reasonable to rely partially upon SRV actuation for BWR.				
63	6.15 4th bullet	The total discharge capacity credited in the analysis is calculated taking into account the sequential opening of the SRVs and that at least one SRV fails to open ~~(or more for systems with a lot of SRVs)~~;	This is undefined. It is sufficient to require failure of at least one SRV.			X	Requested by other reviewer
64	6.35	"…water line should NOT propagate…": both first and last bullets	Correction	X			
65	6.36	"Instrumentation required to ensure the actuation of necessary automatic actions and to support the accident management…"	Correction	X			
66	6.37	Replace ";" with ","	Correction	X			
67	6.97	A RCS depressurization should be implemented to prevent direct containment heating loads caused by the RPV failure at high pressure. This function should be accomplished with a different and dedicated set of SRVs which should be designed to be kept open after the depressurization. Alternatively, upon justification, a diverse means of actuation of the normal SRVs may also an acceptable means of meeting this concern. The use of a valve type other than an SRV may also provide an acceptable alternative._	There are other means of achieving the desired results and their use should also be permitted with sufficient justification				The proposed alternative does not meet SSR 2/1 Rev 1. Requirement 4.13 A