Tables of resolutions of Member States/ International organizations comments before Technical editing

Note: The following tables provide resolutions of Member States/ International Organizations comments on the draft safety guide on Design of Auxiliary Systems and Supporting Systems for Nuclear Power plants, in alphabetic order. These resolutions that have been carried out before the Technical editing are implemented in track changes in the file 'Track changes_DS440 Resolution of MS comments_Before technical editing.pdf'.

Further improvements in terms of language and consistency within DS440 and with other safety guides have been achieved after the Technical editing. These are reflected in the file 'Clean_DS440 Resolution of MS comments and further Technical editing.pdf. In particular, Figure 1 has been simplified and its structure improved to reflect the stepwise approach followed to define the auxiliary systems and supporting systems.

Resolution of Belgium comments

DS 440 – Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants

COMMENTS BY REVIEWER Reviewer: Bel V Country/Organization: Belgium – FANC/Bel V			Page 1of 2 Date:	RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	3.30	" … the failure of some AS&SS has the potential to lead **to** accident conditions, …"	Wording. This proposed correction was "Accepted" in the Step 7a comment resolution form (then it was para 3.29), but was not implemented in the Step 8 version.	X			
2	4.47 – 4.94	This part on sampling systems is to our opinion over-developed compared to other parts (e.g. the part on heat transport systems). See also our comment on 4.78 – 4.93.	For balance of different parts of the document. The comment resolution form for Step 7a mentions "This change may be done during the next step of review by Member States if it is requested." Therefore we reproduce the comment here in Step 8.		X		Comments 2 and 3 have been resolved by having two separate sub-sections for process and post-accident sampling system, and process radiation monitoring system respectively. The impression of "over-development" of this part is also resolved by this way.

3	4.78 – 4.93	These articles are mainly dealing with radiation monitoring; not with sampling systems. It would be better to bring these under another title such as "Radiation monitoring support systems"	For clarity. The comment resolution form for Step 7a refers to the resolution of the comment on 4.47-4.93 (see above) and thus might also be considered in Step 8.		X		See resolution of comment 2.
4	4.115; 1st bullet	"… For example, to maintain negative pressure in controlled areas flowrate intake air **c**ould be less than extraction flowrate air;"	Due to our comment in Step7a on this para, "For example," was added in Step 8 (which responds to our former concern). However, the "should" should be replaced by "could" (in order not to impose this example solution).	X			

Resolution of China comments

DS 440 – Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants

COMMENTS BY REVIEWER Reviewer: Page 1of 14 Country/Organization: CHINA – Date: 2017/10/28				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	Figure 1	The second item of Definition: An auxiliary system may provide services such as electricity, service gas, water, compressed air, conditioning air, communication equipment, lifting and lowering items, fuel and lubricants.	Correspond with the section 1.2	X			
2	2.5	Original text: 2.5. The AS&SS systems to be addressed in this safety guide are stepwise determined on the basis of their definition in paragraph 2.2, and whether or not they are addressed in existing safety guides or safety guides being revised. In particular, heat transport systems (SSR-2/1 (Rev. 1), Req. 70) are partially addressed in the revision of NS-G-1.9 [2], fire protection systems (SSR-2/1 (Rev. I), Req. 74) are covered in [3], and radiation protection systems (SSR-2/1 (Rev. 1), Req. 81 and 82) are addressed	Be consistent the context	X			

		in NS-G-1.13 [4]. Proposal: 2.5. The AS&SS systems to be addressed in this safety guide are stepwise determined on the basis of their definition in paragraph 2.2, and whether or not they are addressed in existing safety guides or safety guides being revised. In particular, heat transport systems (SSR-2/1 (Rev. 1), Req. 70) are partially addressed in the revision of NS-G-1.9 [2], fire protection systems (SSR-2/1 (Rev. 1), Req. 74) are covered in NS-G-1.7 [3], and radiation protection systems (SSR-2/ l (Rev. 1), Req. 81 and 82) are addressed in NS-G-1.13 [4].					
3	3.8	For passive designs, most of the safety systems rely on the driving forces of buoyancy, gravity, stored energy sources and natural convection.	Natural convection should be included.			X	Either to mention driving forces of buoyancy responsible for natural circulation, or to mention natural circulation but not both.
4	3.10	"Load combinations created by internal and external hazards should also be included in the design basis of the SSC of AS&SS", the recommendable load combinations table (specific or typical) should be listed, if possible.	Too vague to implement.		X		Accepted with modification: to delete the sentence " Load combinations created by internal and external hazards

							should also be included in the design basis of the SSC of AS&SS" and to keep para. 3.11.
5	3.10 and 3.11	3.11. could be canceled or be combined in the 3.10.	The contents of 3.11 overlap 3.10			X	See resolution of comment No.4.
6	3.15	The list of internal hazards in section 3.15. include "Electromagnetic interferences", however, this hazard is not shown in NS-G-1.11 *Protection Against Internal Hazards other than Fires and Explosions in the Design of Nuclear Power Plants* (2004). Therefore, some detailed requirements of electromagnetic interferences should be explicit.	"New" definition should he interpreted.			X	The revision of NS-G-1.11 and NS-G-1.7 under DS494 includes Electromagnetic interferences in the list of hazards to which the present draft refers.
7	3.45	"In particular, an AS&SS should not serve both a safety system and a safety feature for a DEC with core melting, unless duly justified." The sentence "unless duly justified" should be explicitly clarified.	Lack of clear explanation.			X	It is recognized in SSR-2/1 (Rev.1) that it is impracticable in some cases to ensure the independence between safety systems (used for DBA) and safety features for DEC, e.g. containment. "Unless duly justified" means here the justification that the independence

							is impracticable. For the meaning of justification, please refer to the IAEA Safety Glossary (2016).
8	3.82	Original text: 3.82. As a complement to a number of investigations related to fabrication, testing, inspection, evaluation of the operating experience, PSA should be used with deterministic safety assessment in demonstrating a very low probability of early or large releases for postulated design extension conditions with core melting. This should include the reliability of involved part of AS&SS supporting a safety function, e.g., heating, ventilation and air conditioning (HVAC) systems and other aspects usually considered in Level 2 PSA. Proposal: 3.82. As a complement to a number of investigations related to fabrication, testing, inspection, evaluation of the operating experience, PSA should be used with deterministic safety	More exact and be consistent with the SSR-2/1.	X			

		assessment in demonstrating a very low probability of early or large radioactive releases for postulated design extension conditions with core melting. This should include the reliability of involved part of AS&SS supporting a safety function, e.g., heating, ventilation and air conditioning (HVAC) systems and other aspects usually considered in Level 2 PSA.					
9	3.56	Original text: 3.56. Following the above recommendations: • In the event of a design basis accident, systems necessary to perform or to support a safety function should be assigned in SSG-30 safety class 1 or 2; Proposal: 3.56. Following the above recommendations: • In the event of a design basis accident, systems necessary to perform or to support a safety function should be assigned in SSG-30 safety class 1, 2 or 3;	Some SSCs belonged to AS&SSs may be assigned in safety class 3, for example, according SSG-30, parts of process and post-accident sampling system as design provision may be assigned in safety class 3.			X	Please note that this recommendation is related to a part of a system ensuring a safety function during design basis accidents. In addition, nowhere in SSG-30, such kind of recommendation exists. Instead, "Requirement 27: Support service systems "Support service systems that ensure the operability of equipment

							forming part of a system important to safety shall be classified accordingly”
10	4.12 4.13 4.14	Original text: 4.12. Communication systems essential to the safe operation should be designed and routed in order to have the capacity to provide effective intra-plant communications (internal communication system) and effective plant-to-off-site communications (external communication system) during normal plant operation, AOO, accident conditions, and relevant internal or external hazards. 4.13. The internal and the external communication systems should have a backup power source. 4.14. Communication systems which essential to the safe operation and emergency communication system ensuring a safety function (safety category 3) should have an appropriate safety classification. Proposal:	Because section 4.12 contains the normal operation state, we suggest revising this paragraph as general requirements for all plant conditions, including normal operation, AOO, accident conditions and so on. Section 4.13 is the requirements of the emergency communication systems during AOO and accident conditions, which should have an appropriate safety classification and a backup power source.		X (only for 4.14)		Para. 4.14 changed in : Communication systems which are essential to safe operation of the nuclear plant should have an appropriate safety classification.

		4.12. Communication systems should be designed and routed in order to have the capacity to provide effective intra-plant commutations (internal communication system) and effective plant-off-site communications (external communication system) during normal plant operation, AOO, accident conditions, and relevant internal or external hazards. 4.13. Communication systems which essential to the safe operation and to ensure a safety function (safety category 3) during AOO and accident conditions should have an appropriate safety classification and a backup power source.					
11	4.17	Original text: • Local plant alarm for accident conditions whose impact is limited to one part of the plant. Proposal: • Local alarms for accident conditions whose impact is limited to one part of the plant.	Maybe, "local alarms" is more appropriate.			X	The recommendation concerns one part of the plant; so: - "Local plant alarm" should remain
12	4.27	Original text:	The cooling of the ventilation system is not all through the ventilation cycle. The ventilation		X		Accepted with a more concise formulation:

		The ventilation systems performing cooling by <u>air renewal (circulation/recirculation).</u> Proposal: The ventilation systems performing cooling by <u>air renewal (circulation/recirculation) and cooling coil.</u>	system is also cooled by the cooling coil.				The ventilation systems performing cooling by air renewal or cooling coil.
13	4.28	Original text: As the ventilation systems are addressed in the section 4.5, only the water cooled components and the chilled water system are concerned here after. Proposal: As the ventilation systems are addressed form item 4.110 to 4.179, only the components cooling water system and the chilled water system are concerned here after.	In this doc1nnent, the design requirements of the ventilation systems are addressed form item 4.110 to 4.179. Here, using "the components cooling water system" is more appropriate. Because this part describes two systems, the components cooling water system and the chilled water system.		X		Accepted with modification for better wording: As the ventilation systems are addressed the sub-section (Air conditioning systems and ventilation systems), only the component cooling water system and the chilled water system are concerned here after.
14	4.39	Original text:	The word "by" before "the extreme design conditions" is unnecessary, because	X			

		The performance of the chillers of CDWS should be based on: • the extreme design temperature of the CCWS water when CDWS is cooled by CCWS or by the extreme design site conditions when cooled by air, and Proposal: The performance of the chillers of CDWS should be based on: • the extreme design temperature of the CCWS water when CDWS is cooled by CCWS or the extreme design site conditions when cooled by air, and	CDWSs have safety function and normal operation function.				
15	4.74	Delete this paragraph.	This requirement is included in Para. 4.60	X			
16	4.115	Original text: • in maintaining the pressure of rooms located in controlled areas below the atmospheric pressure in order to prevent the dispersion of radioactive substances into the atmosphere in normal operating conditions. For example, to maintain negative pressure in controlled	Ventilation terminology		X		Accepted with modification for better formulation by replacing “should” by “could” since it is an example: to maintain the negative pressure in controlled areas,

		areas flowrate intake air should be less than extraction flowrate air; Proposal: • in maintaining the pressure. of rooms located in controlled areas below the atmospheric pressure in order to prevent the dispersion of radioactive substances into the atmosphere in normal operating conditions. For example, to maintain the negative pressure in controlled areas, the supply air rate should be less than exhaust air rate;					intake air flow rate could be less than exhaust air flow rate. Also for consistency with the resolution of the 4th comment from Belgium.
17	4.120	Original text: 4.120. The design of the HVAC systems participating in the limitation of radioactive releases should filter the exhausted air by pre-filters, high-efficiency particulate air (HEPA) filters and, if necessary, by iodine filters before being discharged to the stack. The efficiency requested for the HEPA and iodine filters have to be consistent with the authorized radioactive releases in normal operation and AOO and with radiological objectives in accident conditions.	Ventilation terminology		X		Accepted with modifications (more correct formulation): The efficiency requested for the HEPA and iodine filters has to be commensurate with the authorized radioactive releases in normal operation and AOO and with radiological objectives in accident conditions.

		Proposal: 4.120. The design of the HVAC systems participating in the limitation of radioactive releases should filter the exhaust air by pre-filters, high-efficiency particulate air filters (HEPA) and, if necessary, by iodine filters before being discharged to the stack. The efficiency requested for the HEPA and iodine filters have to be commensurate to the authorized radioactive releases in normal operation and AOO and to the radiological objectives in accident conditions.					
18	4.122	Original text: • Monitoring of the air temperature and automatic isolation of the air flow; • Provision of automatic protection by means of a water sprinkler to cool the outside of the iodine filter vessel; • Provision of a water spray system inside the charcoal vessel with a manual hose connection. In designing such a system. it should be recognized that if the flow rate of the water is too low, the reaction between				X	Consistency with DS494.

		overheated charcoal and water can result in the production of hydrogen. To prevent this, a high water flow rate should be used Proposal: • Detecting of the air temperature or combustion products and automatic isolation of the air flow; • ~~Provision of automatic protection by means of a water sprinkler to cool the outside of the iodine filter vessel;~~ (delete) • Provision of a water spray system inside the charcoal vessel with a fixed firefighting water pipeline or manual hose connection. In designing such a system, it should be recognized that if the flow rate of the water is too low, the reaction between overheated charcoal and water can result in the production of hydrogen. To prevent this, a high water flow rate should be used					
19	4.123	Original text: • Fire detectors, carbon monoxide gas sensors (preferably after the filters) or	Ventilation terminology	X			

		temperature sensors (before the filters) should be installed inside the ducts before and after the filter bank. Proposal: • Fire detectors, carbon monoxide gas sensors (preferably in the downstream of the filters) or temperature sensors (preferably in the upstream of the filters) should be installed inside the ducts in the and downstream of the filter bank.					
20	4.125	Original text: 4.125. The design of the HVAC systems maintaining the ambient conditions (temperature, humidity, contamination and new air) necessary for the operation of components important to safety, the personnel accessibility and the habitability of the control room should take into account the basic atmospheric conditions and the extreme atmospheric conditions (e.g., temperature, humidity, and their duration) defined for the design of the NPP.	More exact	X			

		Proposal: 4.125. The design of the HVAC systems maintaining the ambient conditions (temperature, humidity, contamination and fresh air) necessary for the operation of components important to safety, the personnel accessibility and the habitability of the control room should take into account the basic atmospheric conditions and the extreme atmospheric conditions (e.g., outdoor temperature, humidity, and their duration) defined for the design of the NPP.					
21	4.132	Original text: 4.132. In particular rooms such as the battel) room, component that can release hydrogen in case of leak or stored fuel room, the rate of air renewal should be sufficient to avoid the accumulation of flammable or explosive gas or fuel-vapor mixtures and maintain the flammable gas concentration below the flammable limit. In addition, each electrical battery room that contains batteries which may generate hydrogen during operation should be provided with a separate ventilation exhaust arranged to	Ventilation terminology	X			

		discharge directly to the outside of the building Proposal: 4.132. In particular rooms such as the battery room, component that can release hydrogen in case of leak or stored fuel room, the rate of air renewal should be sufficient to avoid the accumulation of flammable or explosive gas or fuel-vapor mixtures and maintain the flammable gas concentration below the flammable limit. In addition, each electrical battery room that contains batteries which may generate hydrogen during operation should be provided with a separate exhaust ventilation system arranged to discharge directly to the outside of the building.					
22	4.136	Original text: 4.136. The ESFVS system of the controlled area should provide a direct radiological confinement function; it participates to the compliance with the radiological objectives. Proposal:	The “system” is repetitive	X			

		4.136. The ESFVS of the controlled area should provide a direct radiological confinement function; it participates to the compliance with the radiological objectives.					
23	4.165	Original text: 4.165. Part of the VNSCA that is needed to a system achieving a safety function (safety category 1 or 2) in case of DBA should have an appropriate safety classification and meet the associated design requirements (redundancy, emergency power supplied, protection against the internal and external hazards, the periodical tests, quality assurance, and, designed and fabricated according acceptable design codes). Proposal: 4.165. Part of the VSNCA that is needed to a system achieving a safety function (safety category 1 or 2) in case of DBA should have an appropriate safety classification and meet the associated design requirements (redundancy, emergency power supplied, protection against the internal and external hazards, the periodical		X			

		tests, quality assurance, and, designed and fabricated according acceptable design codes).					
24	4.170	Original text: 4.170. The functions of the main control room ventilation system (CRAVS) are to maintain the operation of safety components and to maintain habitable the main control room in normal operation, AOO and accident conditions as well as in the event of smoke, explosive and toxic gases, and radioactive contamination of the external environment. This is ensured in maintaining suitable ambient conditions (temperature, humidity, clean and new air) and concentration of airborne radioactive substances to levels compatible with the habitability of the main control room and the operation of the components. Proposal: 4.170. The functions of the main control room ventilation system (CRAVS) are to maintain the operation of safety components and to maintain habitable the main control room in normal operation, AOO and accident		X			

		conditions as well as in the event of smoke, explosive and toxic gases, and radioactive contamination of the external environment. This is ensured in maintaining suitable ambient conditions (temperature, humidity, cleanliness and fresh air) and concentration of airborne radioactive substances to levels compatible with the habitability of the main control room and the operation of the components.					
25	4.184	Original text: • emergency generator area, SBO Diesel area. Proposal: Delete "SBO Diesel area" • emergency generator area,	The SBO diesel area shall be provided to station blackout lighting, not the emergency lighting. When the emergency electrical power unviable, the personnel can enter the SBO diesel area to start the diesel. Besides, the DC system charger is connected to the emergency power system. So it is not necessary to install the emergency lighting.	X			
26	4.186	Original text: The alternate power supply should provide sufficient level of visibility, at least, in the main control room, the	We can't figure out the meaning of this paragraph, in according with the 4.187 and 4.188, this section		X		Accepted with the modification by highlighting the case of SBO:

		supplementary control room and the emergency preparedness and response centre. Proposal: The emergency lighting system should provide sufficient level of visibility, at least, in the main control room, the supplementary control room and the emergency preparedness and response centre. This lighting system should be supplied by emergency power and DC batteries.	describes the requirements about the level of lighting and power supply for the emergency lighting system. Because section 4.183 requires emergency lighting system should be immediately available in case of loss of off-site power supply until the emergency power supply, so this lighting system maybe also supplied by DC batteries.				In case of SBO, sufficient level of visibility should be provided, at least, in the main control room, the supplementary control room and the emergency preparedness and response centre, and in the locations where operator actions are necessary.
27	4.243	Original text: • Cooling water system which can be external or included in the emergency power source; Proposal: • Cooling water system;	Latter part of the sentence is be difficult to understand and is needless.		X		Accepted with the following modification of the bullet for clarity: - Cooling water system, which can be external or integrated

							in the emergency power source.
28	4.247	Original text: 4.247. Usually, each emergency diesel generator is fined with a short term fuel oil tank fed from a main storage fuel oil tank while combustion turbine is fed directly from the fuel oil storage system through fuel oil forwarding pumps. The short term fuel oil tank is sized to permit at least two hours operation at full load. Proposal: 4.247. Usually, each emergency diesel generator is fitted with a short term fuel oil tank fed from a main storage fuel oil tank while combustion turbine is fed directly from the fuel oil storage system through fuel oil forwarding pumps. The short term fuel oil rank is sized so that when the low level alarm set point is reached, enough fuel remains in the tank to operate the unit for at least 60 minutes at its 110% capacity.	The rule for the size of the short term fuel oil rank in different standard: ANS 59.51, Each diesel shall be equipped with one or more day tank whose capacity is sufficient to maintain at least 60 minutes of operation after reaching the low level alarm set point. URD: Each day tank shall have enough capacity to operate its associated standby power source for at least 4 hours at its maximum rated capacity and shall be designed so that when the level is reached where fuel is automatically added, enough fuel remains in the tank to operate the unit for at least 60 minutes at its maximum rated capacity. RCC-E: Each diesel engine is provided with the fuel oil tank mounted on its fuel feed pumps. This tank, which feeds the diesel engine by		X		More general and concise formulation expressed in terms of objective to be achieved (operator intervention to restore oil level) rather than giving figures: The short term (also called daily tank) fuel oil tank should be sized to permit the operation at full load during a time compatible with operator intervention to restore oil level.

			gravity and is itself fed from the storage tank by transfer pumps, has sufficient capacity to sustain full-load diesel engine operation for 60 min in the event of failure of the fuel transfer pumps. NB (china): Each day tank shall be designed so that when the low level alarm set point is reached, enough fuel remains in the tank to operate the unit for at least 60 minutes at its 110% capacity.				
29	4.249	Original text: 2.249. Each emergency power source should be fitted with..... Proposal: 4.249. Each emergency power source should be fitted with.....		X			
30	4.258	In case of a double walled storage tank is being used, and the annulus between the two walls should be equipped with a leak detection system.	Nearly all of the fuel oil storage tanks of NPP EDG in China were installed in the DG building, and use single walled tank. The double walled tank was		X		Accepted with modification for clarification by underscoring the case where double walled storage tank is used :

			usually used in underground storage oil tank of petrol filling station. In case of a double walled storage tank is being used, and the annulus between the two walls should be equipped with a leak detection system. So in our opinion the use of double walled storage should be not a mandatory requirement. The above opinions are consistent with NRC & ANS regulatory and standards (such as ANSI/ANS-59.51-1997 and RG 1.137.R2)				In case double walled storage tank (e.g. underground tank) is being used, the annulus between the two walls should be equipped with a leak detection system.
31	4.266	Original text: 4.266. The lubrication system should be fitted with protective measures (e.g., relief ports) to prevent unacceptable explosions and to mitigate consequences of such events; Proposal: 4.266. The lubrication system should be fitted with protective measures (e.g., relief ports) to prevent unacceptable	More exact, the relief ports are used for preventing over-pressure.	X			

		over-pressure and to mitigate consequences of such events.					
32	4.272	Deleted	Station blackout (SBO) means the complete loss of alternating current (ac) electric power to the essential and nonessential switchgear buses in a nuclear power plant (i.e., loss of offsite electric power system concurrent with turbine trip and unavailability of the onsite emergency ac power system). The major contributor to overall station blackout risk is the likelihood of losing off-site power and the duration of power unavailability. The next most important contributor to station blackout risk for a given plant is low EDG availability. As we can know from current research documents, LOOPS caused by fire, flood, or seismic activity are not expected to occur with sufficient frequency to require explicit criteria and are not			X	The alternate AC Power Source is designed to withstand at least the design basis earthquake (please refer to para. 5.21A of SSR-2/1 (Rev.1)). According to the recommendation in para. 3.9 (Section 3), the supporting system should comply with the same requirements as the supported system.

			considered. So station blackout does not assume a seismic activity. Alternate AC Power is used to cope with severe-accident (SBO) only, and not for design basis accidents. Features provided for severe-accident protection (prevention and mitigation) only need not be subject to single failure criterion to safety-related equipment and quality assurance requirements, nor environmental qualification (including seismic qualification) requirements based on design basis. So the essential AS&SS of the Alternate AC Power Source should not necessarily be resistant to the Design Basis Earthquake.				

			The above opinions are consistent with NRC & NUMARC code and standards. The corresponding descriptions are shown as follows: • 10 CFR 50.2 *Station blackout means the complete loss of alternating current (ac) electric power to the essential and nonessential switchgear buses in o nuclear power plant (i.e., loss of offsite electric power system concurrent with turbine trip and unavailability of the onsite emergency ac power system). Station blackout does not include the loss of available ac power to buses fed by station batteries through inverters or by alternate ac sources as defined in this section, nor does i1assume a concurrent single failure or design basis accident.* • NUMARC 87-00-1991				

			LOOPS caused by fire, flood, or seismic activity ore not expected to occur with sufficient frequency to require explicit criteria and ore not considered Seismic, fire, and flooding events include accident scenarios for which current licensing requirements specify protective measures. For example, the potential for o fire-induced station blackout is extremely remote due to the effectiveness of current fire protection programs and 10 CFR 50 Appendix R separation requirements imposed on shutdown systems. NRC analysis concludes that fire-induced station blackout is not o generic concern, citing o station blackout frequency of less than 1x10-5 per reactor-year for most plants. Consequently, station blackout events that may occur at a particular site involving fire initiators are not likely to occur. The seismic and flooding issues				

			are similar to the fire risk concern regarding the potential for causing station blackout. The Class 1E power system is currently designed to withstand seismic events. As a result the potential for seismically induced or flooding-induced station blackout is on the same order as fire-induced events, and are not addressed in this document. • SECY-90-016-1990 *The preferred method of demonstrating compliance with 10 CFR 50.63 (station blackout rule) is through the installation of a spare (fall capacity) alternate ac power source of diverse design that is consistent with the guidance in Regulatory Guide 1.155. Besides, the staff believes that features provided for severe-accident protection (prevention and mitigation) only (not required/or design basis accidents) need not be subject to (a) the 10 CFR 50.49 environmental*				

			qualification requirements, (b) all aspects of 10 CFR Part 50, Appendix B quality assurance requirements, or (c) 10 CFR Part 50, Appendix A redundancy/diversity requirements. The reason for this judgment is thti1 the staff does not believe that severe core damage accidents should be design basis accidents (DBA) in the traditional sense that DBAs have been treated in the past.				
33	4.284	Original text: 4.284. EFDS components should be classified on the basis of their functions and their role as barriers, and should meet the associated design requirements, in particular to be subject to periodic testing and inspection. The following EFDS equipment is usually safety classified: • Equipment monitoring reactor coolant system leaks; • Monitoring equipment credited in flooding analysis; • Equipment necessary for containment isolation;	For many NPPs design, the equipment monitoring reactor coolant system leaks is just for normal operating conditions, and is not required to be safety class. Equipment containing radioactive materials, like some piping, can be defined as design provisions (SSG-30).			X	Rejected. However, the first bullet is modified as follows for clarification: - equipment monitoring reactor coolant system leaks if it is the only mean used for that purpose;

		Proposal: 4.284. EFDS components should be classified on the basis of their functions and their role as barriers, and should meet the associated design requirements, in particular to be subject to periodic testing and inspection. The following EFDS equipment is usually safety classified: • ~~Equipment monitoring reactor coolant system leaks;~~ (delete) • Monitoring equipment credited in flooding analysis; Equipment necessary for containment isolation; • Equipment containing radioactive materials and may lead to unacceptable radiological consequences in case of failure (leakage or rupture).					

Resolution of ENISS comments

DRAFT GUIDE DS440 "DESIGN OF AUXILIARY SYSTEMS AND SUPPORTING SYSTEMS FOR NUCLEAR POWER PLANTS" step 7a

ENISS Comments

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Mikko Lemmetty Country/Organization: ENISS			Page 1 of 2 Date: 16 May 2017				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	4.23	Safe, permanent, acoustic, and two-way voice links should be provided with the public authorities: ~~These links should be direct "station to station" telephone links since no dialing is necessary.~~ These links should be in a network that remains operable even during a large-scale disruptions of the electricity grid or of the commercial internet infrastructure. The number of telephones or other terminal devices in each location should be commensurate with the expected telephone traffic.	The requirement for direct two-way links does not improve safety. Even if the plant dedicates emergency communications lines, they will be, in most cases, routed through an IP network which may or may not be part of the internet. If the requirement specified here is followed literally, the emergency response center will be cluttered with ca. 12 direct line telephones, without any improvement to communications reliability.		X .		Accepted but modified as follows to recognize the need to have direct links as practicable and to improve the formulation: Safe, permanent, acoustic, and two-way voice links should be provided with the public authorities: If practicable, these links could be direct "station to station" telephone links since no dialing is necessary. These links should be in a network that remains operable even during large-

							scale disruptions of the electricity grid or of the commercial internet infrastructure. The number of telephones or other terminal devices in each location should be commensurate with the expected telephone traffic.
2	4.130	For example, operation of HVAC equipment and fire dampers could be controlled by two diverse means of detection operating in series if the improvement of the fire safety is larger than the risk caused by the increased frequency of the inadvertent loss of ventilation	Increasing the likelihood of fire detection also increases the risk of inadvertent actuation and consequently, loss of cooling and ventilation provided by HVAC. Such improvements need to be balanced.			X	Addition rejected for the following reasons: - The addition provided is confusing because the objective is to decrease the spurious shutdown of the ventilation (e.g. closure of fire dampers) that can be detrimental to the safety of the plant (e.g. loss of the cooling of a room where are located safety

							equipment and loss of this equipment due to the increase of ambient temperature). To decrease the frequency of spurious shutdown of the ventilation, two diverse fire detectors operating in series can be installed. The decrease of the frequency of the spurious loss of the ventilation will have an adverse impact on fire protection in increasing the probability of non-shutdown of the ventilation <u>in case of fire.</u> - providing more detailed explanation in

COMMENTS BY REVIEWER Reviewer: Mikko Lemmetty Country/Organization: ENISS			Page 1 of 2 Date: 16 May 2017	RESOLUTION			
							the example is not relevant. Finally, it was decided to remove the sentence related to the example.

Resolution of Finland comments

Form for Comments

Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants (DS440)

COMMENTS BY REVIEWER Reviewer: Marja-Leena Järvinen Page.... of.... Country/Organization: STUK/Finland Date: 20.11.2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
	3.16	The SSC of AS&SS should be protected against impacts of high energy hazards (internal missiles, pipe whipping, heavy load drops) or designed to withstand their **loads and the loads caused by explosions as well;**	Please clarify the sentence is confusing. Explosions are high energy phenome thus the approach to the design is different. Some of the explosions should be practically eliminated.		X		Accepted with modification of the first bullet in order to take into account other comments: The SSC of AS&SS should be protected against impacts of high energy hazards (internal explosions, internal missiles, pipe whipping, jet impingement, heavy load drops) or designed to withstand their loads.
	4.7	Different kinds of alarms can be transmitted: fire and other evacuation alarm, general alarm**,**	Is the trailing comma erroneous or are there items still missing from the list?		X		Accepted with modification as follows: Different kinds of alarms can be transmitted, for examples, fire, first aid, evacuation

							alarms and general alarm.
	4.28	As the ventilation systems are addressed in the subsection ~~4.5~~"AIR CONDITIONING SYSTEMS AND VENTILATION SYSTEMS", only the water cooled components and the chilled water system are concerned here after.	The subsection "AIR CONDITIONING SYSTEMS AND VENTILATION SYSTEMS" of section 4 is not numbered.		X		See also resolution of China's comment No. 13
1	4.55	provide the information needed to ensure the confinement of radioactive substances located in the ~~the~~ controlled areas outside containment; and	typo Double "the" word should be removed	X			
	4.67	…seismic resistance of a sampling line until the external isolation valve should be consistent with…	"Second isolation valve" does not express the location of the valve (inner/outer), which is of importance in this context. Please use "external" or "outer" instead of "second".		.	X	The isolation valves concerned here are the isolation valves of the RCS pressure boundary. For better clarity, the para. 4.67 was modified as follows: The safety classification and the seismic resistance of a sampling valve until the second isolation valve of the RCS

							pressure boundary should be consistent with ones of the system sampled.
	4.68	Downstream the isolation valves, the PPASS providing samples from **safety components** should be considered as ensuring a safety function of safety category 3 and should have an appropriate safety classification.	Please elaborate what is meant by ”safety components” as it is not a generally defined term. Please also elaborate which isolation valves are referred to (e.g. sampling system’s isolation valve).		X		Accepted with the following modification for clarity and more general formulation: Downstream the isolation valves of the RCS pressure boundary, the PPASS should be considered as ensuring a safety function and should have an appropriate safety classification.
2	4.69	… As in post-accident condition, it may be necessary, as applicable, to sample the primary coolant so as to check the boron concentration, to measure the primary coolant activity and to determine the composition of the primary coolant fission products. …	There is a need to measure “primary coolant activity” not primary activity. In some plant configurations, sampling systems connected to RCS may/should be expected to have also RCS isolation valve(s), and these may be partly different from the		X		Accepted with the link to US comments. The reason of presenting containment isolation valves is not to increase the volume of the draft safety guide but because the recommendations

			containment isolation valves. (In addition, is it necessary to add volume by presenting the containment isolation valve requirements in this section as they concern systems in general, not only sampling isolation?)				apply to the sampling lines.
3	4.83	For the personnel protection, a continuous monitoring of the atmosphere of the containment should be provided to allow personnel intervention and to deliver alarm for personnel evacuation notably ~~further~~ prior to a fuel handling accident.	Clarity Please reconsider the word "prior" in stead of "further".		X With the following wording for clarity: For the personnel protection, a continuous monitoring of the atmosphere of the containment should be provided to allow personnel intervention and to deliver alarm for personnel evacuation notably in case of a fuel handling accident.		The alarm for personnel evacuation cannot be generated prior to the accident! The recommendation is modified as follows for clarification: For the personnel protection, a continuous monitoring of the atmosphere of the containment should be provided to allow personnel intervention and to deliver alarm for personnel evacuation notably in case of a fuel handling accident.

	4.111	"ARAVS" -> ?	The acronym "ARAVS" is mentioned here but not in the rest of the chapter. Instead "ETBVS" is mentioned and explained later on. Maybe worth considering using one acronym throughout the chapter for consistency.	X			
	4.115	… For example, to maintain negative pressure in controlled *areas flowrate intake air* should be less than *extraction flowrate air*; … in maintaining an air flow going from rooms with a lower contamination risk towards rooms with higher contamination risk, **as practicable for accident conditions**; …	Please clarify: 1) The text uses definitions "flowrate intake air" and "extraction flowrate air". The wording in these two definitions is unclear and inconsistent. Should these be for example "intake air flowrate" and "exhaust air flowrate"? 2) Why is the text in red?	Accepted and corrected.	X		Accepted with modifications in line with the resolution of the Chinese comment No.16.
	4.125	The design of the HVAC systems maintaining the ambient conditions (temperature, humidity, contamination	Please clarify:		X		"contamination" replaced by

		and new air) necessary for the operation of components important to safety, the personnel accessibility and the habitability of the control room should take into account the basic atmospheric conditions and the extreme atmospheric conditions (e.g., temperature, humidity, and their duration) defined for the design of the NPP.	The text says: "… HVAC systems maintaining the ambient conditions (temperature, humidity, contamination and new air)… The word "contamination" in the list of ambient conditions is a bit strange as I think "maintaining the ambient conditions" is something that is preferred, while contamination is not preferred. Please consider other wording for the description of "maintaining ambient conditions". Seems that contamination is not one of the features of preferred ambient conditions that should be maintained.				"acceptable activity level"
	4.134	"Emergency core cooling **system** rooms" "Residual heat removal **system** rooms"	For clarity, please consider adding the word "system". Please apply throughout the document. "RHRS" instead of "RHRS system"	X			To be implemented throughout the draft.

			The word system is already in the acronym.				
	4.162 1st bullet	The CSWS should be designed: - taking into account that during transfer of spent fuel in the fuel storage pool, a damaged fuel clad could induce releases of radioactive gases and aerosols in some area of the containment, (DS440, Rev 1) 44 - for reducing in normal cold shutdown states the radioactivity of gaseous releases to the environment below the authorized limits and to keep them as low as reasonably achievable, - for participating to the containment *isolation (safety category 1), isolating devices should have an appropriate safety classification)* in case of high level radioactivity within the containment in accident conditions; - for improving efficiency of hydrogen control system in the containment.	Please use "fuel cladding" instead of "fuel clad" Commonly used definition The use/number of brackets is inconsistent..	X. X			To be implemented throughout the draft.
	4.203		This contains details on a much more technical level than the rest of the section.	X.			To replace second by redundant.

			Also the paragraph is not unambiguous and clear. … ensured either by a safety brake acting on the drum or by a *redundant* hoisting mechanism.				
4	4.213	… chemistry for reactor coolant and other systems to minimize the production of corrosion products	Plural is needed for "corrosion products"	X			
	4.263	When the emergency power source receives a start signal, the cooling water system should change automatically of operating mode **(standby conditions to the cooling water configuration).**	What does the sentence in brackets mean?	.	X		Accepted with the following modifications for clarification: When the emergency power source receives a start signal, the cooling water system should automatically provide the required cooling (switching from standby conditions to required cooling conditions)

	4.267	In addition, the capacity of lube oil storage at the site should permit to **ensure more long term** operation until recovery of the supply of lube oil to the site.	The term "more long term" is vague. Please add: until recovery of the supply of lube oil to the site		X		Accepted with the following modifications (long term instead of more long term): In addition, the capacity of lube oil storage at the site should permit to ensure long term operation until recovery of the supply of lube oil to the site.
	4.270	**A weather event, another external event or internal event** should not damage an essential auxiliary system of the emergency power source and an essential auxiliary system of the Alternate Power Source.	Please clarify: Is this the same as "Any external or internal event"?		X		Accepted with the more general formulation: Any postulated external or internal hazard should not damage an essential auxiliary system of the emergency power source and an essential auxiliary system of the Alternate Power Source.
	4.284	Extra list ";" should be removed	typo	X			
	4.297	…	Please clarify:		X		X

		Storms inducing the loss of off-site power and a loss of ultimate heat sink, Earthquake induced the loss of off-site power and ultimate heat sink.	Should this sentence be made clearer to indicate that the UHS is actually lost? E.g. Storm-induced loss of off-site power and ultimate heat sink or loss of the ultimate heat sink due to flooding. Earthquake inducing the -> Earthquake-induced?				- Storm-induced loss of off-site power and loss of the ultimate heat sink, - earthquake-induced loss of off-site power and loss of ultimate heat sink.
	ANNEX 1	CDWS: ~~Essential~~ Chilled Water System	For consistency	X			
	ANNEX 1	Several inconsistent uppercase/lowercase	For consistency	X			
	ANNEX 1	CCF missing from list	For consistency	X			

Resolution of Germany comments

Draft Specific Safety Requirements "DS440, Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants",
Status: STEP 8, Comments by Member States

	COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Ministry of the Environment of Baden-Württemberg and GRS) Pages 3 Country/Organization: **Germany** Date: 2017-11-22				RESOLUTION			
Rele-vance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2	1	3.16	Layout and design provisions should be provided to protect the SSC of AS&SS and its associated systems against the effects of the considered internal hazards, for example: …	1. It should be made clear in this paragraph that the layout and design provisions for the SSC of AS&SS have to be made only for internal hazards that have been identified to have relevant effects. 2. The list in this paragraph is not necessarily complete, so it would be better to denote its items as examples.		X		Better wording Accepted with modifications as follows for better wording: Layout and design provisions should be provided to protect the SSC of AS&SS and its associated systems against the effects of the postulated internal

	COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Ministry of the Environment of Baden-Württemberg and GRS) Pages 3 Country/Organization: **Germany** Date: 2017-11-22				RESOLUTION			
Rele-vance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
								hazards, for example:
2	2	3.30	Depending on the design, the failure of some AS&SS has the potential to lead to accident conditions, …	To avoid misunderstandings, the phrase should be changed.	X			
2	3	4.63.	For example, PPASS should, as applicable:….. • allow verification in normal operation that the boron concentration of the refueling water storage tank water, the accumulator water and the water in the additional borating system is adequate to guarantee core sub-criticality in case of relevant accident conditions; and • ……	The added system and components are of particular safety significance regarding boron concentration.		X		These are limited examples. Additional borating system would not be included in all the designs. therefore, the comment is accepted with the following modification: • allow verification in normal operation that the

	COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Ministry of the Environment of Baden-Württemberg and GRS) Pages 3 Country/Organization: **Germany** Date: 2017-11-22				RESOLUTION			
Rele-vance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
								boron concentration of the refueling water storage tank water, the accumulator water is adequate to guarantee core sub-criticality in case of relevant accident conditions; and
2	4	4.85.	As applicable, activity measures in the main steam pipes, blow-downs of the SGs and condenser should be provided to monitor secondary side activity continuously and provide operator's alarm and if	It is a common design feature that a high ^{16}N-activity level in steam lines automatically shuts down the reactor.		X		Accepted with modified wording: As applicable, activity measures in

	COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Ministry of the Environment of Baden-Württemberg and GRS) Pages 3 Country/Organization: **Germany** Date: 2017-11-22				RESOLUTION			
Rele-vance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			appropriate automatically activate safety functions.					the main steam pipes, blow-downs of the SGs and condenser should be provided to continuously monitor secondary side activity, provide operator's alarm and automatically activate safety functions as necessary
1	5	4.111 a (new)	Design provisions should be implemented in such a way that HVAC components allow the decontamination of potentially contaminated surfaces.	HVAC components like ducts, fans or valves which operate in a environment of potential radioactive substances must be easy to decontaminate.			X	Not specific to HVAC components.

	COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Ministry of the Environment of Baden-Württemberg and GRS) Pages 3 Country/Organization: **Germany** Date: 2017-11-22				RESOLUTION			
Rele-vance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	6	4.126	When part of a HVAC system is a support system required to permit to a safety system to ensure its safety function (safety category 1 or 2) in case of DBA, it should have an appropriate safety classification and consequently meet the associated design requirements such as: ……. • Components designed, manufactured, commissioned and tested according to acceptable quality standards; • Components designed and manufactured according to acceptable design codes. • <u>Ventilation system should have means to protect the containment against excessive negative pressure.</u>	The new requirement is a standard design feature of safety significance. Passive operating components are to prefer.		X		Accepted, but put as a bullet in 4.162 (related to containment ventilation system).
1	7	4.268 a (new)	<u>The air starting system should be designed in such a way that several starts are possible without refilling the compressed air tanks.</u>	In the case of a diesel start failure a fast repetition of starts must be possible.		X		Just to modify “needed” in “necessary”.

	COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)** (with comments of Ministry of the Environment of Baden-Württemberg and GRS) Pages 3 Country/Organization: **Germany** Date: 2017-11-22				RESOLUTION			
Rele-vance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
								The end of 4.268 is modified as follows: […], combustion air intake and engine exhaust, electrical systems, and air starting. In particular, the air starting system is designed in such a way that several starts are possible without refilling the compressed air tanks.

Resolution of India comments

Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants (DS 440)

Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants (DS 440)							
COMMENTS BY REVIEWER **Reviewer** : **Country/Organisation** : INDIA			**Date**:28/12/2017	**RESOLUTION**			
Comment No.	**Page/ Para/Line No.**	**Proposed new text**	**Reason**	**Accepted**	**Accepted, but modified as follows**	**Rejected**	**Reason for modification / Rejection**

1.	**8/2.1**	**Clarification:** **The Para says that:** A nuclear power reactor has the following main (or primary) systems: the reactor core, the reactor coolant system and the containment structure and containment system and their associated safety systems and safety features (SSR-2/1 (Rev.1), Req. 43 to 58). By exclusion, the remaining systems are considered as auxiliary systems (SSR-2/1 (Rev.1), Req. 59 to 82) to the main systems and their associated features. General definition and extent of the auxiliary systems are given in the following sections. **Clarification is required on the correctness of scope of this guide**.	i. It assumes that all the requirements of SSR 2.1 from Req. 59-82 are related to auxiliary systems while SSR 2.1 suggests that Req. 69-76 are related to Support and Auxiliary Systems ii. Req 60 & 61of IAEA SSR 2.1 is on control System and Protection System which are not auxiliary systems iii. Likewise Req 65, 66 are on MCR and SCR which are not treated as auxiliary systems iv. The draft guides talks about the items listed as Req 69-76 of IAEA SSR 2.1 with one addition of Treatment of radioactive waste. v. Req 68 is on Emergency power supply			X	According to the DPP, a definition of auxiliary systems and supporting systems was missing. We started by defining auxiliary systems and then supporting systems. In line with that definition, the systems concerned by the requirements 59 through 82 are auxiliary systems or supporting systems. The scope of the safety

							guide was then limited to examples of auxiliary systems/ supporting systems that are important to safety and not addressed in other safety guides providing recommend ations to fulfil the requirement s 59 through 82.

2.	**13/3.16/ First Bullet**	The SSC of AS&SS should be protected against impacts of high energy hazards (internal missiles, pipe whipping, jet impingement, heavy load drops) or designed to withstand their loads and the loads caused by explosions as well	Jet impingement is an important internal hazard to be protected against.	X			See also comment No. 1 from Finland.

3.	**13/3.16/ Last Bullet**	A single hazard should not have the potential for a common cause failure between AS&SS supporting safety systems designed to control design basis accidents, and safety features required in the event of Design Extension Conditions including accidents with core melting.	This criteria needs to be applied to DEC without significant fuel degradation conditions too.		X		Slightly modified formulation in order to underscore the case of design extension conditions with core melting: A single hazard should not have the potential for a common cause failure between AS&SS supporting safety systems designed to control design basis accidents, and safety features required in

							the event of design extension conditions, in particular design accidents with core melting.

4.	**20/3.76**	**Suggestion:** The design should be such that AS&SS supporting safety systems or safety features for DEC should not be shared between units of a multiple unit nuclear power plant. However OESC may be common to all units at multiple unit NPPs	The OESC which would house operators/responders during an accident (SA) when MCR/SCR/Local Points are not available may be common for all NPPs at one site.			X	The added sentence is not relevant in this paragraph , which provides recommend ations.

5.	**24/4.19**	The paging system should reach all areas of the plant and be audible over the whole site, both inside and outside the buildings. The design should be such that it is possible to use this system from the main control room and SCR, the main control room having a priority over other available control points.	This facility should be available from SCR too as under certain accident conditions MCR may not be available. In such case necessary announcements can be made from SCR. This would also be in line with the 4.7 of the draft guide.		X		Accepted with the following modification related to the supplementary control room: The paging system should reach all areas of the plant and be audible over the whole site, both inside and outside the buildings. The design should be such that it is possible to use this system from the main control room and the supplement

							ary control room, the main control room having a priority over other available control points

6.	**26/4.31**	In addition to the heat loads to be considered, the heat transport system capability should be ensured taking into account the design temperature limits of the heat sink and suitably ~~pessimistic~~ conservative considerations (calculation performed with appropriate allowances for uncertainties).	The terminology used in IAEA SSR 2.1 is "Conservative". Therefore the same may be used in this guide.	X			
7.	**21/3.81**	In this respect, PSA should be considered as a good tool to assess the ~~consequences~~ risk of the loss of AS&SS on the supported system or function.	PSA provides the risk estimates, which is a product of frequency and consequence. However, the required analytical input for 'consequence' is derived from deterministic analysis.		X		Accepted with better wording: In this respect, PSA should be considered as a good tool to assess the likelihood and the consequences of the loss of AS&SS on the supported system or function.

The additions are indicated in red colour with yellow highlight. Strikethrough represents proposed deletion.

Resolution of Japan comments

Japan comments on DS440 "DESIGN OF AUXILIARY SYSTEMS AND SUPPORTING SYSTEMS FOR NUCLEAR POWER PLANTS"

COMMENTS BY REVIEWER Reviewer: Japan NUSSC member Page.... of 6 Country/Organization: Japan/NRA Date: 26 Dec., 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
1.	2.7./ the last	However, in this safety guide, mainly ~~only~~ those systems important to safety are considered.	Clarification related to the scope of this safety guide. The list of AS/SS includes systems not important to safety (e.g. communication systems and lighting systems).			X	Communication systems and lightning systems are important to safety according to the definition in the IAEA Safety Glossary (2007). They are subject to SSR-2/1 (Rev.1) requirement 37 and requirement 75 respectively.
2.	3.31.	When considering multiple failures leading to DEC, the failure of AS&SS related to ~~supporting~~ safety systems or safety features should be taken into account.	Clarification. "Multiple failure DEC" is not clearly defined. Duplication: "SS" includes "supporting"		X.		Accepted with modification for better wording: When considering multiple failures leading to DEC, the failure of AS&SS that

COMMENTS BY REVIEWER Reviewer: Japan NUSSC member Page.... of 6 Country/Organization: Japan/NRA Date: 26 Dec., 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
							support safety systems or safety features should be taken into account.
3.	3.74.	Define “cross-connection”.	The definition is needed because the word is new and nowhere to be found in this safety guide and other Safety Standards.		X		“cross-connection” can be replaced by “inter-connection”
4.	3.76.	Each unit of a multiple unit nuclear power plant ~~The design~~ should have its own ~~be such that~~ AS&SS related to ~~supporting~~ safety systems or safety features ~~for DEC should have its own not be shared between units of a multiple unit nuclear power plant~~.	To keep a consistency with SSR-2/1 (Rev. 1) requirement 33. “Safety features” doesn’t need to be limited like “for DEC” according to IAEA Safety Glossary 2016.			X	The proposed formulation is not clear, and safety features in 3.76 are meant for DEC, and not in general.
5.	4.47.	The following recommendations provide guidance to fulfil requirements 71 ~~and 82~~ of SSR-2/1 (Rev. 1).	Requirement 82 of SSR-2/1 (Rev. 1) is addressed in NS-G-1.13, as stated in para 2.5, and the subtitle does not include “MONITORING”. The role and the function of sampling system are clearly different from those of monitoring system. This difference should			X	Monitoring should be part of this safety guide. Please refer to the resolution of Belgium

COMMENTS BY REVIEWER Reviewer: Japan NUSSC member Page.... of 6 Country/Organization: Japan/NRA Date: 26 Dec., 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
			be clearly and separately stated in each documentation. Moreover, some recommendations under the subtitle "EXTENT OF THE AUXILIARY SYSTEMS AND SUPPORTING SYSTEMS" should be deleted to avoid duplications between DS440 and NS-G-1.13.				comments No. 2 and No.3.
6.	4.49.	The PPASS should be capable to provide the ~~water~~ liquid and gaseous samples, during ….	Editorial.	X			
7.	4.70.	~~The system should be designed and constructed so that radiological dose to the plant workers is as low as reasonably achievable (ALARA).~~	Duplication with para 4.71.			X	Paragraphs 4.70 and 4.71 are not the same, in the sense that para. 4.70 is general and para. 4.71 is detailing the measures to achieve 4.70.
8.	4.78.-4.94.	Candidate para to be deleted are as follows; 4.78 - 4.83, 4.85, 4.87 - 4.91 and 4.94.	The same comments as #5 in para. 4.47.			X	Please refer to the resolution of comment No. 5.

COMMENTS BY REVIEWER Reviewer: Japan NUSSC member Page.... of 6 Country/Organization: Japan/NRA Date: 26 Dec., 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
9.	4.97.	A CAS should provide a continuous supply of compressed air to pneumatic instruments and actuators supporting components ensuring a safety function, in sufficient quality, cleanliness, volume flow and pressure with specifying minimum number of actuation of each accumulator, in every design condition.	Actuation number for each accumulator should be specified.			X	Please refer to para. 4.101. The concern of capacity is addressed there.
10.	4.99.	If CAS provides air for important to safety and not important to safety components, the important not to safety components should be able to be isolated from the CAS ~~not important to safety components~~.	It is not important to safety components to be isolated.			X	Please note that the isolation is between the components of CAS important to safety and the components of CAS that are not important to safety. The proposed formulation does not correctly reflect the recommenda-tion.

COMMENTS BY REVIEWER Reviewer: Japan NUSSC member Page.... of 6 Country/Organization: Japan/NRA Date: 26 Dec., 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
11.	4.111.	The safety requirements of a HVAC system depend on its safety functions. HVAC systems have mainly two functions, i.e. limiting radioactive release and limiting introduction of airborne radioactive substances through HVAC systems. Therefore, ~~I~~it is usual to distinguish the following categories : ・ The HVAC systems or part of these systems participating in the limitation of radioactive releases outside the radiation controlled area, in particular by filtering airborne radioactive substances in the air in specific areas: This category includes notably the engineered safety feature ventilation system (ESFVS) of the controlled area, the fuel building ventilation System (FBVS), the auxiliary and radwaste area ventilation system (ARAVS), the containment sweeping ventilation system, and annulus ventilation system if applicable; ・ The HVAC systems	Clarification. The main purpose of this para should be to describe there are two major functions for HVAC systems before paras 4.112 thru. 4.116 concerning details of them.		X		Modifications have been introduced since in addition to the limitation of radioactive releases and the limitation of introduction of airborne radioactive substances, the HVAC has to maintain within building others important ambient conditions (e.g. temperature and humidity).

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
		maintaining the ambient conditions required for the space where systems and components important to safety are installed and the space where the Control Room habitability is required so that airborne radioactive substances in the air aren't be introduced: This category includes notably the electrical building ventilation system, the diesel generator building ventilation system, the pumping station ventilation system, ~~and~~ the control room area ventilation system (CRAVS) and on-site emergency response facilities' ventilation systems.					Accepted with modifications: The safety requirements of a HVAC system depend on its safety functions. HVAC systems have mainly two functions, the limitation of radioactive releases and the maintenance of the ambient conditions (temperature, humidity, radioactivity) required for systems and components

COMMENTS BY REVIEWER Reviewer: Japan NUSSC member Page.... of 6 Country/Organization: Japan/NRA Date: 26 Dec., 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
							important to safety and the accessibility or habitability of rooms. Therefore, it is usual to distinguish the following categories : ・ The HVAC systems or part of these systems participating in the limitation of radioactive releases…. ・ The HVAC systems maintaining the ambient conditions required for

COMMENTS BY REVIEWER Reviewer: Japan NUSSC member Page.... of 6 Country/Organization: Japan/NRA Date: 26 Dec., 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
							systems and components important to safety as well as the habitability of Control Rooms and on-site emergency response facilities: This category includes notably the electrical building ventilation system.…
12.	4.115.	Move para 4.115 after 4.112.	Restructuring paras 4.112 thru 4.116. By doing so, first, para 4.112 and 4.113 will describe the functions for limiting radioactive release, and then para 4.114 thru 4.116 will describe the functions for limiting introduction of airborne			X	Please consider this rejection as consequence of resolution of comment No. 11.

COMMENTS BY REVIEWER Reviewer: Japan NUSSC member Page.... of 6 Country/Organization: Japan/NRA Date: 26 Dec., 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
			radioactive substances to maintain ambient conditions.				
13.	4.115. (new4.113)/L 5-6, L12	…For example, to maintain negative pressure in controlled areas flowrate of intake air should be less than ~~extraction~~ flowrate of exhaust air; … The radioactivity of the exhaust air ~~extracted~~ from the controlled area.	Editorial and for better wording consistent with other paras.	X X			
14.	4.113. (new 4.114.)	The HVAC systems should ensure ~~one or more of~~ the following functions to limit introduction of airborne radioactive substances as appropriate: ・To maintain the ambient conditions of rooms in terms of temperature, humidity and airborne radioactive substances; ~~・To monitor and limit the gaseous radioactive releases during normal operation, anticipated operational occurrences (AOO) and accident conditions;~~	Clarification. The 2nd bullet to be deleted because the new 4.113 already describes the same phrase and this para only describes the function to limit introduction of airborne radioactive substances.			X	Please refer to the resolution of comment No. 11.

COMMENTS BY REVIEWER Reviewer: Japan NUSSC member Page.... of 6 Country/Organization: Japan/NRA Date: 26 Dec., 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
		・ To protect the personnel and/or equipment from risks coming from inside or outside the buildings.					
15.	4.116.	The personnel and/or the equipment should be protected against some risks coming from inside the buildings (more particularly anoxia, fire propagation and explosion in rooms were combustible gas can be produced) and from outside buildings (more particularly external explosion, volcanic gases, ash, etc., forest fire and extreme weather conditions as well as toxic gases by accident).	Adding some examples of external hazards to be considered in the design from the Japanese practices.		X		With more concise formulation: The personnel and/or the equipment should be protected against some risks coming from postulated internal hazards (e.g. anoxia, internal fires and explosions) and from postulated external hazards (e.g. extreme weather conditions, toxic gases)

COMMENTS BY REVIEWER Reviewer: Japan NUSSC member Page.... of 6 Country/Organization: Japan/NRA Date: 26 Dec., 2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification
16.	4.174.	The design of the CRAVS should permit to isolate the main control room for avoiding the introduction of smoke, explosive and toxic gases, and radioactive contamination of the external environment due to external events via the intake vents.	Adding the introduced substances besides toxic gases consistent with para 4.170.		X		With modification for more clear and concise formulation: The design of the CRAVS should permit to isolate the main control room for avoiding the introduction of any substance, which can be harmful to the personnel or the equipment.

Resolution of Pakistan comments

TITLE DS-440

Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants

COMMENTS BY REVIEWER Reviewer: Tauqeer Hussain, CNS Page.... of.... Country/Organization: Date:20-10-2017				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	3.71/ Page19	layout should: • make provision for construction, assembly, installation, erection, **COMMISSIONING/OPERATIONS**, maintenance, decommissioning, and demolition;	Provision of space for access of personnel during commissioning/operation of plant may be considered.		X		For better formulation: • make provision for construction, assembly, installation, erection, commissioning, operation, maintenance, decommissioning and demolition;
2.	4.160,4.171,/ Page 43,45	……..meet the associated design requirements (redundancy, emergency power supplied, protection against the internal and external hazards, the periodical tests, **MAINTENANCE,INSPECTION**, quality assurance, and, designed and	Maintenance and inspections are essential requirements of plant design.		X		For better formulation: […] meet the corresponding design requirements (redundancy, emergency power

		fabricated according acceptable design codes.)					supplied, protection against internal and external hazards, periodic testing, quality assurance, maintenance, inspection and, design and fabrication according acceptable design codes).

Resolution of Poland comments

Form for Comments

"Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants" (DS440, Rev 1)

COMMENTS BY REVIEWER Reviewer: PGE EJ 1 Sp. z o.o. Country/Organization: POLAND				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	Paragraph 4.115, page 37	Some words are in red color.	Editorial	X			
2.	Paragraph 4.202, page 49	Different font sizes are present.	Editorial	X			
3.	Paragraph 4.284, page 60	There is missing text in one bullet.	Editorial	X			

Resolution of UK comments

COMMENTS BY REVIEWER Country/Organization: FRANCE + GERMANY / AREVA NP Date: November 3, 2017 pages				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection

AREVA NP	general	Consistency between safety standards and wording	Consistency with DS481 should be improved (general consideration for the design could even be common to both guides). DS440 should use the same wording used in SSR-2/1 when requirements are the same (lots of rewording to express the same requirements as SSR-2/1) Wording should be more consistent within the document between various paragraphs or even within a single paragraph: main systems, supported systems, systems, support systems, AS&SS, equipment, SSC The text is sometime quite vague : Example # 3.3 "may vary", # 3. 7 "with appropriate margins"		X		It is recognized that the wording could be improved. Section 3 was developed in coordination with the development of DS482 Section 3.. The comment regarding the consistency between "main systems", "supported systems", is rejected because we did not mean the same systems. In particular, main systems was introduced to distinguish these systems from auxiliary systems in the definition of auxiliary systems and supporting systems.

AREVA NP	general	Ordering the provisions in a structured manner	Certain sections of DS440 read like a succession of items without logic and some redundancies. DS440 often contains "good practices" that are generic and not specific to the system, but without completeness.			X	Please specify your comment. However, in order to improve Section 3, a new paragraph is added after the existing para. 3.12. in order to make the link with the recommendations that follow.
AREVA NP	2.7	**Remark:** **One important AS&SS is the grounding and lightning protection system, especially for electrical and I&C systems. Details referring this system are described in SSG-34 for electrical and SSG-39 for I&C.**	The grounding and lighting protection is an important system; a reference should be included in this document.			X	These systems are addressed in SSG-34 and SSG-39. One of the principal directing this safety guide is to avoid addressing systems addressed elsewhere. Moreover, this safety guide is not intended to deal with all AS&SS, but only with some examples.

AREVA NP	3.6	The safety class of AS&SS systems or components should be assigned with due consideration of the safety class of the systems or components served by them, **and of the safety function ensured by the systems or components served by them for which operation of the AS&SS systems or components is required**, and the consequence of the failure of the AS&SS. .	Safety classification of the AS&SS should also be consistent with the safety function for which it is required, and should not only be determined by the safety classification of the supported system: eg if the supported system has enough autonomy to reach controlled state without the supporting system, and needs the supporting system only to reach the safe shutdown state, the supporting system should be classified as a system required to reach the safe shutdown state.	X			

ARE VA NP	3.7	Each system providing an essential service should have the capacity, ~~**duration**~~ **autonomy**, availability, robustness and reliability **in accordance to the safety function and** ~~**to meet**~~ the maximum demands of its dependent systems with appropriate ~~**safety**~~ margins	'Autonomy' is more appropriate than 'duration'. Reliability, availability and robustness are not linked to maximum demands of the dependent systems but to importance of the safety functions of the supported systems. Safety margins refer to the safety studies.		X		Better formulation and footnote to explain the meaning of autonomy: Each system providing an essential service should have the capacity, autonomy, availability, robustness and reliability in accordance with the safety function and the maximum demands of its dependent systems with appropriate margins.

AREVA NP	4.7	A wireless system can be used in normal and emergency conditions.	Example of "satellite phone" to be deleted or replaced by "e.g. DECT phone". This point describes the onsite telephone system. The satellite function of satellite phones will not function inside any NPP buildings. But the output power of phone types could be too high in regards of EMC. Acronyms: DECT: Digital Enhanced Cordless Telecommunications EMC: Electromagnetic Compatibility	X			
AREVA NP	3.8	~~For passive designs, most of the safety systems rely on the driving forces of buoyancy, gravity, and stored energy sources. This means that they contain no active components (for example: no pumps and include valves that are operated by either air pressure or direct current (DC) electric power from batteries, or use check valves actuated by the pressure differential across the valve). These designs may induce much less need of safety classified AS&SS to support the safety functions.~~	Out of the scope since not related to the design of AS&SS but to general NPP design			X	Some of the systems in Section 4 pertain to para. 3.8

AREVA NP	3.9	The reliability of a safety function depends not only on the **main** systems ensuring its fulfilment but also on the reliability of AS&SS that are ~~**needed for the good operability of the supported systems**~~ **required to support them in performing this safety function. […]**	First part: Consistency with §2.1 + make difference from AS&SS Second part: reliability of support system has impact on the reliability of the safety function only if support system is required for the function (eg safety function required in the short term while AS&SS not required in the short term for operation of the main system or support system only used for DEC A functions while main system required for DBC and DEC-A)		X		"required" replaced by "necessary". The reliability of a safety function depends not only on the main systems ensuring its fulfilment but also on the reliability of AS&SS that are necessary to support them in performing this safety function.

ARE VA NP	3.9	should be commensurate with the reliability of the supported systems, i.e., the requirements of AS&SS should be consistent with those applied to the supported systems. Therefore, the reliability **and design requirements** of AS&SS should be commensurate with the reliability of the supported systems, i.e., the requirements ~~**of AS&SS should be consistent with those applied to the supported systems.**~~**and design requirements of the supported systems, for the safety functions they are contributing to ensure.[…]**	reliability and requirement of support system has to be commensurate to the main systems only for safety functions there are required for (see previous comment)	X			
ARE VA NP	3.9	[…] ~~Hence, the design of the AS&SS should be assessed with the same detail as for the main systems supported by AS&SS.~~	Same reason as previous remark + "Assessed" refers to a safety assessment not a design objective			X	A design has to be assessed anyway.

AREVA NP	3.10	The design basis for the safety classified SSC of AS&SS should include any condition created by normal operation, anticipated operational occurrences, accident conditions (design basis accidents (DBA) and design extension conditions (DEC)) **the AS&SS is required for**. Loads combinations created by internal and external hazards should also be included in the design basis of the SSC of AS&SS **when relevant**.	SSC of AS&SS has not to cover any DBA or DEC conditions but only those the AS&SS is required for. SSC of AS&SS has not to cover any load combination created by internal or external hazard but only combinations required by the safety rules taking into account the safety functions of the AS&SS This § should be more appropriate in PIE part		X		Better wording by replacing "required" by "necessary": The design basis for the safety classified SSC of AS&SS should include any condition created by normal operation, anticipated operational occurrences, accident conditions (design basis accidents (DBA) and design extension conditions (DEC)) the AS&SS is necessary for. Loads combinations created by internal and external hazards should also be included in the design basis of the SSC of AS&SS when relevant.

ARE VA NP	3.11	**!!!** Design conditions and design loads should be derived, as appropriate, from combinations of bounding conditions determined for the relevant plant states or hazards. **!!!**	To rewrite in a more easy way to understand !		X		Design conditions and design loads should be calculated, as appropriate, taking into account bounding conditions determined for each of the relevant plant states or hazards.
ARE VA NP	3.13	The design should prevent that ~~**failures of**~~ **a failure in** an AS&SSs under the scope of this Safety Guide would lead to a postulated initiating event~~**. If this is not possible**~~**, or** the design should include appropriate measures for the mitigation of this event, considering the effects of the failure of the AS&SS on other plant systems.	To be limited to one failure. Otherwise, the original sentence can lead to understand that multiple failures should be considered Always possible to avoid such situation but not in an ALARP way.		X		Multiple failures are not excluded.
ARE VA NP	3.16	~~**The SSC of AS&SS should be protected against impacts of high energy hazards (internal missiles, pipe whipping, heavy load drops) or designed to withstand their loads and the loads caused by explosions as well;**~~	No interest to point out specifically "high energy hazards" which are not clearly defined. In addition SSC shall not be systematically protected against these hazard (one redundancy could be lost)			X	Consistency with systems addressed in Section 4.

AREVA NP	3.19	AS&SS needed to ensure the operation of systems required to mitigate **Design Basis** Accident conditions should be designed to withstand the design basis earthquake (DBE) and should be protected against the effects of other **design basis** external hazards and against common cause failure mechanisms that could be generated by those hazards.	In some countries, DBE not to be combined to DEC-A conditions and the protection of systems required to mitigate DBA against DEH is not required. Maybe 3.19 should be written in a less prescriptive manner, expressing that applicable design rules should include consideration of external hazards.			X	The alternate AC power source is designed to withstand at least the DBE (see SSR-2/1 (Rev.1), para. 5.21A
AREVA NP	3.20	Any SSC whose failure could compromise the operation of above AS&SS should be designed to withstand the design basis earthquake (DBE) and should be protected against the effects of other **design basis** external hazards and against common cause failure mechanisms that could be generated by those hazards.	Similar comment as for 3.19. In certain countries, the protection of systems required to mitigate DBA against DEH is not required			X	See resolution of the previous comment.
AREVA NP	3.21	~~Any SSC of AS&SS whose failure could initiate accident conditions should be designed to withstand the design basis earthquake (DBE) and should be protected against the effects of other external hazards and against common cause failure mechanisms that could be generated by those hazards.~~	It could be acceptable to initiate accident conditions by failure of AS&SS provided that mitigation means remains available			X	See resolution of the previous comment.
BAE	3.22	Amend text "…integrity is required during **and/**or after the hazard	The equipment may have to work in both situations.	X			

ARE VA NP	3.24	Short term actions related to AS&SS and necessary to meet the dose limits and engineering criteria established for the supported system in the event of design basis accidents or design extension conditions should be accomplished with ~~**permanent**~~ **on site** systems (SSR-2/1 (Rev.1), Req. 17, para. 5.17).	"on site": SSR-2/1 only requires short term autonomy without relying on off-site means (but does not exclude on site mobile means)		X		Permanent is used here by opposition to "non-permanent", which is used in the requirements of SSR-2/1 (Rev.1). Only equipment that can be ready in a time commensurate with the "short term actions" can be used. Therefore, the following formulation is proposed: For external hazards, short term […] should be accomplished with on-site systems that are ready to operate in a time commensurate with the time necessary for the short term actions (SSR-2/1 (Rev.1), Req. 17, para. 5.17).

BAE	3.25	Additional sentence. "Where necessary, consideration should be given to support services reaching site in adverse conditions."	In some instances, (severe weather, evacuation) the time take to reach the site may be extended.		X		More clear formulation: Where necessary, consideration of external supplies should take into account the adverse conditions and damages caused by the external hazards.
ARE VA NP	3.26.	Compliance with SSR-2/1 (Rev.1), Req. 17, para. 5.21A requires that the SSCs ultimately necessary to prevent early or large **radioactive** releases be still operable in case of external natural hazards **levels** exceeding those considered for design taking into account the site hazard evaluation. This applies to AS&SS equipment whose operability is required for this purpose.	Consistency with SSR-2/1 (Rev.1), Req. 17, para. 5.21A	X			
ARE VA NP	3.27	For external flooding, this would mean that either all the structures hosting the above mentioned systems are located at an elevation higher enough than the design basis flood elevation, or that adequate safety features (e.g., water tight doors**)** ~~**should be**~~ **are** provided in the design to protect these ~~**structures**~~ **SSCs** and ensure that **their safety functions** ~~**mitigating actions**~~ can be maintained.	Sequence of tenses Safety features can also protect systems or components (not only structures)	X			

ARE VA NP	3.29	Accident conditions relevant for the design of the AS&SS should be those having the potential to cause ~~**excessive**~~ **important** mechanical loads **and** ~~**or**~~ to jeopardize the safety functions ~~**to which**~~ the considered auxiliary system is participating **to**.	Wording	X			
ARE VA NP	3.35	In order to achieve the adequate reliability of AS&SS supporting safety functions, the following factors should be considered: - Safety classification and the associated engineering aspects' requirements for design and manufacturing; - Design criteria relevant for the systems (e.g., number of redundant trains, seismic qualification, environmental qualification, power supplies); - Consideration of vulnerabilities to common cause failures by means of diversity, physical separation, **functional** independence; […]	Consistency with SSR-2/1 req 24 and DS481	X			Please note that DS481 states only "independence" para. 3.51, and not "functional independence".
ARE VA NP	3.36	The design should be such that the safety functions of category 1 or 2, as defined in SSG-30 [8], for which a part of an AS&SS is needed in the event of design basis accidents can be fulfilled despite the consequential failures caused by the postulated initiating event and a single failure postulated in any ~~**part of the**~~ system **or safety group** needed to accomplish the functions. Unavailability for maintenance, testing or repair should be considered in addition.	Consistency with DS481 At the level no need to enter partially in the way single failure has to be applied + compliance to SSR-2/1	X			

ARE VA NP	3.37	The ~~**AC**~~ **internal emergency** power source should be designed as to have adequate capability to supply power to electrical equipment needed to accomplish the safety functions in the event of design basis accidents. AS&SS equipment required to operate in accident conditions should be powered by the emergency or the alternate power supply source.	Internal emergency power source can provide AC or DC (batteries)	X			
ARE VA NP	3.38	~~**Vulnerabilities for common cause failures between the redundancies of the AS&SS supporting safety systems should be identified, and design or layout provisions should be implemented to make the redundancies independent to the extent practical.**~~ Adequate physical separation should be implemented between the redundant trains of the safety systems to prevent common cause failure due to the effects of hazards considered for design.	Independency (i.e. functional separation, geographical or physical separation and diversity) has not to be considered within the redundancies on a safety system required to mitigate a DBA accident The proposed is consistent with recommendation from DS481			X	Note that 3.38 is consistent with DS482, which is at more advanced stage of approval and the recommendation is more complete (not only physical separation).

ARE VA NP	3.43.	The additional safety features should be **as far as necessary** ~~**preferably**~~ power supplied by the ~~**alternate AC**~~ **internal emergency** power source.	SSR2/1 6.44A, clearly states that that the alternative power source is meant to address the " event of the loss of off-site power combined with failure of the emergency power supply " therefore it does not mean that any DEC feature has to be power supplied by this alternative source. Internal emergency power source can provide AC or DC (batteries)			X	Please consider that para. 6.44A of SSR-2/1 (rev.1) can be interpreted differently. The initial proposal is consistent with DS481 (para. 3.56) and is also consistent with DS482 (see second part of para 3.58)
ARE VA NP	3.44	SSCs of AS&SS necessary to mitigate the consequences of an accident with core melting should be capable of being supplied by any of the available power sources **(cf. SSR-2/1 rev.1, requirement 6.44B).**	It is suggested to make reference to SSR-2/1 rev.1 requirement 6.44B to clarify that 'any' reports to the 'emergency power source' or to the 'alternate power source.		X		Improved formulation: SSCs of AS&SS necessary to mitigate the consequences of an accident with core melting should be capable of being supplied by any of the available power sources (SSR-2/1 (Rev.1), paragraph 6.44B).

ARE VA NP	3.45	**As far as practicable,** independence between safety systems and specific safety features necessary to mitigate the consequences of an accident with core melting should be implemented in the design. In particular, an AS&SS should not serve both a safety system and a safety feature for a DEC with core melting, unless duly justified.	Consistency with SSR-2/1 (Requirement 7 - Application of Defense in Depth §4.13A): "The levels of defense in depth shall be independent as far as practicable to avoid the failure of one level reducing the effectiveness of other levels. In particular, safety features for design extension conditions (especially features for mitigating the consequences of accidents involving the melting of fuel) shall as far as is practicable be independent of safety systems."	X			

vAREVANP	3.50	The following recommendations contribute to implement independence between levels of defence-in-depth: […] - Vulnerabilities to CCF between those items should be identified and the consequences assessed. Where the challenge to the safety function leads to unacceptable consequences, the vulnerabilities to CCF should be removed to the extent possible. In particular, safety features designed to mitigate the consequences of accidents with core melting should be, **as far as practicable,** independent from equipment designed to mitigate consequences of design basis accidents;	Consistency with SSR-2/1 (Requirement 7 - Application of Defense in Depth §4.13A): "The levels of defense in depth shall be independent as far as practicable to avoid the failure of one level reducing the effectiveness of other levels. In particular, safety features for design extension conditions (especially features for mitigating the consequences of accidents involving the melting of fuel) shall as far as is practicable be independent of safety systems."	X			

ARE VA NP	3.52	The safety ~~**classification**~~ **class** of any part of an AS&SS required to support a system to ensure a safety function should be commensurate with the ~~**classification**~~ **class** of the **safety function ensured by** the system supported by this AS&SS **for which it is required for**. In case part of ~~**an auxiliary**~~ **a supporting** system is supporting safety systems or safety features of different safety classes, it should have the same safety ~~**classification**~~ **class** as the system or component having the highest safety ~~**classification**~~ **class**.	Vocabulary : Classification refers to the process of allocating a safety class. Safety class of the AS&SS should be more consistent to the safety function for which it is required than the safety class of the supported system: eg if the supported system has enough autonomy to reach controlled state without the supported system, and needs the supporting system only to reach the safe shutdown state, the supported system should be classified as a system required to reach the safe shutdown state Auxiliary system replaced by supporting system in consistency with definition given in §2.4	X			

ARE VA NP	3.53	According to Member States' practices, generally the effect of the failure of a SSC should be considered both on the accomplishment of the function, and on the level of the radioactive releases **directly induced**. For items to which both effects are relevant, the safety class and the associated quality requirements ~~**needed to achieve the expected reliability**~~ are defined with due account taken of those two effects. For items which do not contain radioactive material, the safety class and the quality requirements are directly derived from the consequences assuming the considered **safety** function is not accomplished.	Potential indirect radioactive releases induced by the failure of SSC are not systematically taken into account in the safety classification in the practices mentioned There is no quantified expected reliability awaited from a specific safety class Concerns only systems ensuring safety functions			X	Consistency with DS481, para.3.63

ARE VA NP	3.54	Engineering requirements applicable to a whole system **or set of systems** (e.g., single failure criterion, independence, emergency power supplied) **required to perform a safety function** should be commensurate with the consequences assuming the function is not accomplished.	Single failure and independence can be applied at the level of functions or of set of systems to perform a safety function		X		Improved formulation: Engineering requirements applicable to a whole system or a set of systems (e.g., independence, emergency power supply) necessary to perform a safety function should be commensurate with the consequences assuming the function is not accomplished.

AREVA NP	3.55	The safety classification should be established in a consistent manner such that all parts of systems necessary for the accomplishment of ~~**a single**~~ **one safety** function are assigned in the same safety class **or justification should be provided.**	This § is contradictory with § 3.53 where it is explained that safety classification depends on two aspects: safety function performed and direct radiological consequences in case of failure of the SSC. Therefore two SSC of a same system required for a same safety function can have two different safety class -> at least need to add "or justification should be provided" ; in addition, it makes the requirement more consistent with DS 481		X		Consistency with DS482. Also, the last part of the sentence "or justification should be provided" is not kept because otherwise, we have to add it in many other recommendations, and details on safety classification are provided in SSG-30. Finally, para 3.55 reads: The safety classification should be established in a consistent manner such that all systems necessary for the accomplishment of one safety function including the associated support systems are

							assigned in the same safety class.
ARE VA NP	3.60	The relevant environmental and seismic conditions that may prevail prior to, during and following an accident, the ageing of the SSC throughout ~~the~~ its life time ~~of the plant~~, synergistic effects, and margins should all be taken into consideration in the environmental qualification [9] and [10].	Lifetime of the SSC is not necessarily the life time of the plant			X	Consistency with DS481 and DS482. The recommendation does not mean the lifetime of the SSC is the same as for the plant.
ARE VA NP	3.61	Environmental qualification should be carried out by means ~~of or, as necessary, the combination of:~~ ~~— type testing on equipment representative of that to be supplied;~~ ~~— actual testing on the supplied equipment;~~ ~~— application of relevant past experience in similar applications;~~ ~~— analysis based on reasonable engineering extrapolation of test data or operating experience under pertinent conditions.~~ **of testing, analysis and the use of experience, or by a combination of these.**	Consistency with DS481: no reason to be more detailed on this topic for AS&SS than for RCSA	X			

AREVA NP	3.62	Environmental qualification should include the consideration, as appropriate, of such factors as temperature, pressure, humidity, radiation levels ~~and~~ **taking into account** local accumulation of radioactive aerosols, vibration, steam impingement, flooding and contact with chemicals. Margins and synergistic effects should also be considered. In cases where synergistic effects are possible, materials should be qualified for the most severe effect, or the most severe combination or sequence of effects.	Local accumulation of radioactive aerosol is included in radiation level	X			
BAE	3.64	Additional sentence "Where like-for-like replacement is not possible, the alternative equipment should be adequately tested upon receipt and in-situ to ensure complete compatibility and functionality with existing equipment."	This is to allow for obsolescence.			X	This addition rather pertains to plant modifications.
AREVA NP	3.69	For the design of safety classified SSC of AS&SS, widely accepted **or well-proven** codes and standards should be used. The selected codes and standards should be applicable to the particular concept of the design and should form an integrated, comprehensive and consistent set of standards and criteria. If different codes and standards are used for different aspects of the same item or area, their consistency should be clearly demonstrated.	Codes or standards based on large experience can also be a guarantee of a proven design even if not widely shared and accepted. SSR-2/1 (Requirement 9) uses the wording 'relevant'	X			

AREVA NP	3.74	Cross-connection of AS&SS providing essential services to each other or with ~~**lower safety class of**~~ AS&SS **of lower safety class** that could compromise the functionality of those should be avoided, unless it can be proven that the cross-connection is beneficial in terms of safety. Where such cross-connections are established, provision should be made to enable the isolation of the essential service from these other services if necessary.	understanding	X			
AREVA NP	3.76	The design should be such that AS&SS supporting safety systems or **supporting** safety features for DEC should not be shared between units of a multiple unit nuclear power plant.	Understanding: initial wording can lead to consider that both safety systems and safety features refer to DEC	X			
AREVA NP	4.38	CDWS lines penetrating the containment should be provided with appropriate automatic **or passive** containment isolation features [12]. This part of the CDWS system should be safety classified (safety category 1) and should meet the corresponding design requirements.	Check valves can also ensure a quick isolation	X			

ARE VA NP	4.44	The CCWS should achieve the **main** following ~~–~~ functions~~:~~ - To remove heat from equipment and transfer it to the ultimate heat sink in operational states and accident conditions; ~~**To ensure a protection against release of radiological contamination into the ultimate heat sink.**~~	Avoiding radioactive releases into the UHS is an induced function of CCWS, which is more design dependent, as well as to avoid radioactive releases outside the containment Another way to proceed would be to list all the safety functions CCWS is involved in but they are more design dependent			X	Although this CCWS function might not be relevant in the context of heat transport, this function is important to be mentioned because it is essential to be considered during the design of the system.
ARE VA NP	4.54	The PPASS should perform monitoring of boron concentration in the RCS (during Normal Operation and **if needed in** accident conditions for PWR, and after an ATWS event for BWR) and gadolinium for PHWR.	No requirement to perform boron sampling in post-accident operations.	X			To be integrated in the revised version of the section on sampling and monitoring.
ARE VA NP	4.58	The PPASS should be designed to function in ~~**all**~~ DBA and during DEC for which **related sampling** ~~**samples**~~ **or monitoring** are needed (e.g., ~~**samples from both the gas and the water**~~ **monitoring** within the reactor containment during severe accidents).	PPASS or at least some systems that are parts of the PPASS, such as reactor sampling system are not necessarily needed in DBA	X			

ARE VA NP	4.60	A systematic analysis should be performed by a laboratory located within the plant. For specific infrequent analysis, the use of a laboratory located outside the plant or outside the site could be acceptable. ~~**In all cases,**~~ **As far as reasonably practicable,** the design and arrangement of the PPASS should be such that the time span between the sampling and the analysis is minimized; this could be achieved by reducing distances or considering fast transportation means of the samples.	Not always possible. See for instance the sampling of the SIS accumulators on PWR		X		Take only "As far as practicable": A systematic analysis should be performed by a laboratory located within the plant. For specific infrequent analysis, the use of a laboratory located outside the plant or outside the site could be acceptable. As far as practicable**,** the design and arrangement of the PPASS should be such that the time span between the sampling and the analysis is minimized; this could be achieved by reducing distances or considering fast transportation means of the samples.

AREVA NP	4.65	~~In order to control the radioactive releases, the sampling line should have a closed fail safe position~~.	Physically difficult to have closed fail safe position to avoid releases (e.g. with check valves) and allow sampling (not possible with check valve that close in case of a break downstream.		X		For clarification Accepted with the following formulation of 4.65: In case the sampling lines are equipped with power operated valves, these valves should have a closed fail safe position in order to control the radioactive releases.

AREVA NP	4.69	Sampling lines connected to systems located inside the containment should be provided with appropriate automatic containment isolation features [12]. For example, ~~**sampling lines from the RCS, the residual heat removal system, or the emergency core cooling system have at least two isolation valves.**~~	Examples are not relevant for all plant design (e.g RHRS is outside containment on EPR)		X		Controversial examples have been removed. The paragraph reads: Sampling lines connected to systems located inside the containment should be provided with appropriate automatic containment isolation features [12]. For example, sampling lines from the RCS have at least two isolation valves.
AREVA NP	4.109	. To increase reliability of the instrument air systems, ring topology and air distributors (headers) should be used. **In case headers are used**, redundant valves should be supplied by different air distribution headers.	Redundant valves can be supplied by different compressed air storage tanks (no need for headers) like GCT a on French CPY plants	X			

ARE VA NP	4.122	Second bullet: "Monitoring of the air temperature **or other measured value with reference to a combustion (e.g. carbon monoxide concentration)** and ~~**automatic**~~ isolation of the airflow"	The measurement of temperature only may not be the most appropriate monitoring. In general, this smooth process does not need an automatic action: operator manual action could be sufficient		X		More concise formulation. Accepted for all comments related to 4.122 with the following modification: Second bullet: - Monitoring of the air temperature or other measured value with reference to a combustion and isolation of the airflow; - Dedicated provision for fire suppression.

ARE VA NP	4.122	Third bullet: "~~**Provision of automatic protection by means of a water sprinkler to cool the outside of the iodine filter vessel**~~;"	The performance of such protection is not clear. Activation of sprinklers outside the filter vessel is delayed and would most likely take place when the fire would be spreading out of the vessel. Therefore the efficiency of the recommended protection measure is not clear. Sprinkler system is typically designed for the entire room cooling and extinguishing fire.		X		See resolution above for para. 4.122
BAE	4.122	Additional text. "Where such a water-spray system is in place, it is advisable to check that HEPA filters will not be affected by the increased humidity/water ingress."	HEPA filters are susceptible to getting wet, and can suffer complete failure. This may also be a consideration for other paragraphs in the document.		X.		See resolution above for para. 4.122
ARE VA NP	4.122	Fourth bullet: "…To prevent this, a high water flow rate should be used. **The water injected into the filter housing should be drained or considered as an additional weight in the mechanical design**"	If the filled-in water mass is very high, the stability of the construction and connecting ducts/supports is endangered		X.		See resolution above for para. 4.122

ARE VA NP	4.123	"Where combustible filters are used in a HVAC system **(and these filters have a non-negligible fire load)**…"	The single HEPA filter banks should not be protected by such measures: the fire load is quite small, ignition is very unlikely and the complete filter central would be very complicate if filters are separated. Maybe a more clear statement regarding fire from inside/outside and HEPA or iodine should be given.			X	The issue here is the damage to the filters (loss of filtering capabilities) and not the fire load presented by the filters.
BAE	4.213 2nd bullet	Query What is dihydrogen concentration?	Is there a chemical formula that could be quoted? Dihydrogen compounds include water.	X			Meaning Hydrogen.

ARE VA NP	4.125	Add to the end: "…of the NPP. **For extreme temperatures different operating modes of HVAC systems (e.g. switch to pure recirculating mode where possible) may also be adequate measures. It may be sufficient to provide justification, that in extreme conditions no cliff-edge leads to the malfunction of the HVAC system or acceptable room air temperatures are not exceeded**"	The extreme temperatures are normally based on 10000 years return period. Such unlikely temperatures do not occur suddenly. For such extreme temperatures a recirculating air operation mode during the day is an acceptable measure to prevent an oversizing of systems/equipment due to conservative assumptions for extreme temperatures. Anyhow: if the installed capacity is not sufficient it is normally no problem that room temperatures rise a bit within the acceptable limits. But the systems should not have cliff-edge effects (e.g. air-cooled chillers with max. condensing temperature switch)			X	Extreme atmospheric conditions means here maximum atmospheric conditions considered in the design basis. Therefore, the added text is not relevant for this paragraph, and the only modification consists in replacing extreme by maximum.
ARE VA NP	4.176	Add a sentence: "…control room. **In case the supplementary control room is only entered in case of fire in the MCR a justification for less protection measures might be sufficient**"	The supplementary control room is only entered in case of fire of MCR. It should not be necessary to install the same protection issues (toxic…) as for MCR			X	This addition does not comply with SSR-2/1 (Rev.1), para. 6.41, and it is a specific case.

BAE	4.242	Additional Bullet "Where applicable, the support system is to be capable of supplying power to all grouped reactors simultaneously"	On multi-reactor sites, the system may have to support all the reactors in case of a "global" power outage.			X	As understood, this addition is not consistent with SSR-2/1 (Rev.1), see 3.76.
ARE VA NP	4.245	The essential AS&SS required for the operation of the emergency power source should be considered as supporting systems of equipment ensuring a safety function of category 1. They should have the same safety classification as the emergency power source and should meet the associated design requirements: - Redundant design to satisfy the single failure criterion **in consistency with the supported system**; - […]	The way the text is written could let assume that the single failure criterion shall be taken into account for the design of AS§SS of each emergency power source, leading for instance to have two fuel oil storages or two cooling water systems for each diesel		X		More clear formulation: Redundant design to satisfy the single failure criterion applied to the function to be performed

AREVA NP	4.251	Add: 4.251. The quantity of oil stored within the site should have the capability to ensure the operation of all emergency power sources of a NPP further to a loss of off-site power supply induced by an earthquake (no recovery of the off-site power supply during a long time). The exact duration of the recovery time of the off-site power supply should be defined by the national authorities or in other applicable rules and standards.	For the dimensioning of the storage tanks exact values are needed.		X		With the modification for clarity: 4.251. The quantity of oil stored within the site should have the capability to ensure the operation of all emergency power sources of a NPP further to a loss of off-site power supply induced by an earthquake (no recovery of the off-site power supply during a long time).). The quantity of fuel oil stored should be justified in terms of the recovery time of off-site power or the time necessary to resupply fuel oil.

AREVA NP	4.258	Add: 4.258. Each storage tank should be double walled, and the annulus between the two walls should be equipped with a leak detection system. Alternative to the double wall and the leak detection system administrative measures, as a regular inspection of the fluid level by the staff, could be considered.	Alternatives by administrative measures should be included.			X	See resolution of the Chinese comment in which the para.258 was modified as follows: In case of double walled storage tank (e.g. underground tank) is being used, the annulus between the two walls should be equipped with a leak detection system.

ARE VA NP	4.271	Add: 4.271. The AS&SS of the Alternate AC Power Source should ensure their function during a time consistent with the recovery time of an off-site power supply or, failing that, an emergency power source. The exact duration of the recovery time of the off-site power supply or emergency power supply should be defined by the national authorities or in other applicable rules and standards.	For the dimensioning of the storage tanks exact values are needed.		X		With the modification: 4.271. The quantity of oil stored within the site should have the capability to ensure the operation of all emergency power sources of a NPP further to a loss of off-site power supply induced by an earthquake (no recovery of the off-site power supply during a long time). The quantity of fuel oil stored should be justified in terms of the recovery time of off-site power or the time necessary to resupply fuel oil.	
BAE	General	The document should be checked to ensure the first use of an abbreviated term is indicated (eg anticipated operational occurrences (AOO))		X				

BAE	General	The grammar used in the document is not consistent, but this may be due to translation of the document.		X			The document is expected to go through technical editing; contributions are from different Member States.

Resolution of USA comments

Comments
Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants (DS440)

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Nuclear Regulatory Commission Country/Organization: United States of America			Page 1 of.4.. Date: 12/19/17				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
	Content	In the "SCOPE" entry, under the "1. INTRODUCTION", add the dotted line from "SCOPE" to 6 (Missing)	Editorial	x			
	Figure 1, Definition box	The word "Communication" uses a different font. Please make the same.	Editorial	x			
	Figure 1, Definition box	Revise the second bullet to read: - An auxiliary system **can** provide services such as electricity, cooling water, compressed air or other gases, means of lubrication and communication.	Figure 1 should be compatible with terminology used in paragraphs 2.2 and 2.3	x			
	3.10.	Revise to Read: "3.10. The design basis for the safety classified SSC of AS&SS should include any condition created by normal operation, anticipated operational occurrences, accident conditions (design basis accidents (DBA) and, as appropriate, design extension conditions (DEC)). Load combinations created by internal and external hazards should also be included in the design basis of the SSC of AS&SS."	The basis for this modification is that it is now consistent with the Convention on Nuclear Safety and associated Vienna Declaration on Nuclear Safety.			X	The addition of "and as appropriate" does not comply with SSR-2/1 (Rev.1).

	3.24	Revise to Read: "3.24. Short term actions related to AS&SS and necessary to meet the dose limits and engineering criteria established for the supported system in the event of design basis accidents or, as appropriate, design extension conditions should be accomplished with permanent systems (SSR-2/1 (Rev.1), Req. 17, para. 5.17)."	The basis for this modification is that it is now consistent with the Convention on Nuclear Safety and associated Vienna Declaration on Nuclear Safety.			X	See resolution of previous comment.
	3.37	Revised beginning of sentence to read: "The AC/**DC** power source should …"	There may be DC power sources.		X		Accepted as follows for more general formulation and consistency with the resolution of the related UK comment:: The internal emergency power source should…
	3.41	Revise to read: "3.41. The more likely combinations of PIEs and common cause failures (CCFs) between the redundancies of the safety systems should be analyzed. If there is a significant increase in risk, the vulnerabilities should be removed or additional design features should be implemented to cope with such situations."	No requirement for analysis of DEC to be comparable to DBAs.			X	The proposed modification "If there is a significant increase in risk" is quite vague, compared to "consequences exceed the limits for DBAs".

	3.43	Revise to read: "3.43. Any additional safety features should be preferably power supplied by the alternate AC power source."	This revision is grammatically correct.		X		With modification for better formulation: 3.43. Any additional safety features should be preferably power supplied by the alternate power source.
	3.45	Revise to read: "3.45. Independence between safety systems and specific safety features necessary to mitigate the consequences of an accident with core melting should be implemented in the design. In particular, an AS&SS should not serve both a safety system and a safety feature for core melting, unless duly justified."	The use of the term DEC is not needed as there is nothing unique to a system independence when considering a goal to mitigate consequences of core melt.			X	There is a need to use the term DEC because the concerned safety feature is designed to cope with DEC.
	4.6	Add to the end of the existing sentence the following: "Communication systems used for security force personnel and plant security protection is outside this scope."	Clarify the intent of 4.6 to avoid confusion.			X	To avoid raising additional issues regarding safety and security interface.
	4.7	Add an addition bullet: • "Wireless radio system for normal and emergency communications."	This new bullet makes the criteria consistent with paragraph 4.22.			X	See resolution of UK comment No.6.

	4.22	Add to the end of the existing text the following: "Areas of wireless radio transmission that may cause serious electromagnetic interferences and have plant consequences, for example plant trips, should be clearly marked in the plant as radio exclusion areas."	The addition text makes paragraph 4.22 consistent with paragraph 3.15	X			
	4.24	Add to the end of the existing sentence: "…, including training simulator (if on site)."	On site simulators are often used to perform emergency drills.		X .		For consistency:: including emergency drills.
	4.34	Revise third sentence to read: "Sufficient water volume of coolant should be provided to ensure adequate cooling after all situations to be considered in accident conditions and adequate provisions should be made to replenish water volume and ensure long-term heat removal.	"Stock(s)" is not a common engineering term for this situation. The term "water volume" is an improved term	X			
	3.56	Revise the second bullet to read: • "Systems implemented to cope with the loss of safety systems should be assigned in SSG-30 safety class 2 or safety class 3;"	The basis for this modification is that it is now consistent with the Convention on Nuclear Safety and associated Vienna Declaration on Nuclear Safety.			X	Consistency with SSG-30.
	3.76	Revise to read:	The basis for this revision is that the principle should			X	Consistency with SSR-2/1 (Rev.1),

		"3.76. The design should be such that AS&SS supporting safety systems or safety features should not be shared between units of a multiple unit nuclear power plant."	apply regardless of inclusion of DEC.				Requirement 33, and Section 3 of this draft.
	4.58	Revise to read: "4.58. The PPASS should be designed to function in all DBA and, as appropriate, during DEC for which samples are needed (e.g., samples from both the gas and the water within the reactor containment during severe accidents)."	The reason for this revision is that it makes it consistent with the Convention on Nuclear Safety and associated Vienna Declaration on Nuclear Safety.		X		In consistency with the resolution of the related UK comment.
	4.54	Revise to read: "The PPASS should perform monitoring of core poison concentrations in the RCS (during Normal Operation and accident conditions for PWR (i.e., boron), and after an ATWS event for BWR (i.e., sodium pentaborate)) and gadolinium for PHWR.	The revised sentence makes the criteria correct, as BWRs do not use Boron for reactivity control post ATWS. BWRs uses sodium pentaborate in this situation.		X		Accepted with the following modification without "core poison concentrations" to avoid misunderstanding related to "poison": The PPASS should perform monitoring of the concentration of soluble neutron absorbers in operational states and in accident

							conditions, as applicable.
	4.63	Second bullet: Revise to add PWR. • "for PWRs, allow verification in normal operation that the boron concentration of the refueling water storage tank water is adequate to guarantee core sub-criticality in case of relevant accident conditions; and	It is necessary to limit this bullet to PWRs, as BWRs do not have RWSTs.		X		Accepted with the following modification by giving examples: • for PWR, allow verification in normal operation that the boron concentration, e.g. in the refueling water storage tank water and the accumulator water is adequate to guarantee core sub-criticality in case of relevant accident condition
	4.71	Deleted, ")", after PPASS.	Editorial	X			
	4.71	Add to the existing text:, "For Compressed air start systems for emergency diesel generator see 4.243."	This clarifies where to locate appropriate criteria.			X	For consistency with recommendations for other systems and for concise text.

	4.156	Revise the second bullet to read: • the area containing the compartments of the main equipment of the RCS (including Drywell for BWRs). That area is not accessible by personnel when the reactor is at power.	This clarifies that BWRs have an area inside containment – drywell.			X	No added value.
	4.157	Add the following bullet to the existing text: • For BWRs, within the containment, drywell is cooled during normal operation by a closed loop ventilation system designed to hold the average temperature in the drywell.	This is added for completeness, as the BWR drywell cooling is missing.			X	The safety guide is meant to be, as far as possible, technology-neutral.
	4.177	Revise to make the font consistent with remainder of the document.	Editorial	X			
	4.190	Following the existing text, add: "The overhead lifting equipment is not used for moving new or irradiated nuclear fuel or associated fuel instrumentation."	This revision clarifies that nuclear fuel is not moved using this system.			X	For consistency.
	4.202	Delete the underlining and correct the font to be consistent with the remainder of the document.	Editorial	X			
	4.205	Revise the first sentence to read: "Handling equipment should be tested prior to the commissioning to its	This clarification improves the criteria for overloading.		X .		More concise formulation:

		maximum expected load/weight (for example steam generator, reactor head, etc.), not to exceed its design limit."					Handling equipment should be tested prior to the commissioning to at least its maximum expected load.
	4.215	Revise the last sentence to read: "For instance, (PWRs only), …"	This clarifies that boron acid is only used in PWRs.		X		Modified as follows for clarification: For instance, in PWRs, the portions of circuits carrying…..
	4.243	Add the following: "The Compress Air System and the emergency power support system - air starting systems are not shared or cross connected.	This revision clarifies that these are separate air systems (not shared or interconnected). This is consistent with paragraph 4.96.			X	The proposed revision is already at the beginning of para. 4.243.
	4.284	Remove the last bullet with no text.	Editorial	X			