	Proposed Resolution of NUSSC Comments on DS 430 SG on Design of Electrical Power System for NPPs Rev. 1 20120628 Rev. 1 changes in RED text.								
#	Reviewer	No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted but Modified as Follows	Rejected	Reason for rejection / modification
1	Algeria CRNB	1	2.29	…from non safety equipment during abnormal events, normal or	Correct the paragraph if it is related only on events, or complete it (ref. definition of events in the IAEA safety glossary).			x	The IAEA safety glossary definition of events only applies in the context of reporting and analysis of events. Thus the safety glossary definition is not germane to the usage in this paragraph.
2	Algeria CRNB	2	2.7	…to bring the plant to a controlled state following …and to maintain it in a controlled state or safe state until off-site sources can be restored.	Editorial.			x	In some cases it may not be possible to being the plant to a safe state using only on site power. Station black-out conditions for example.
3	Algeria CRNB	3	3.4, 3.6 and 3.7	Replace functions with structures	Replace the word if it is only an editorial error, or make a footnote to define the meaning of functions here.			x	Function is used with the normal dictionary meaning. The classification of systems and components derives from their function. Added structures to account for structural elements such as raceway and cable supports. Functions are not cited in paragraph 3.5 because the meaning of "item important to safety" is limited to SSC.
4	Algeria CRNB	4	5.35	Internal hazards of concern include: fire, internally generated missiles…, steam jets, pipe whip, chemical explosions, internal flood,	For more clarity.			x	Since missiles and flood are listed as internal events it seems clear that they are internal flood and missiles.
5	Algeria CRNB	5	References	Ref [2] Design of Emergency power systems for Nuclear Power Plants.	It is the correct title of the safety standard NS-G-1.8 as it was published in 2004.	x			
6	Belgium Bel V	1	5.4	delete redundant text	Editorial: §5.4 appears twice: once on page 22 then on page 23	x			
7	Belgium Bel V	2	7.43	"A 10-15 % overload capacity for a minimum of two hours every 24 hours is typically provided."	It is standard practice that the frequency of allowed short-time overload is specified.	x			
8	Belgium Bel V	3	Figure 7	The sections a b and c, which are defined in the caption of figure 7, should be indicated on the curve.	Clarity of the figure	x			
9	EC JRC	1	5.188	It is common practice to apply the most rigorous environmental qualification methods only to components **important to safety**.	Based on classification on page 18, components important to safety comprise safety and safety related components. A proposal is to use term "important to safety" consistently with 5.180. The EQ in 5.188 should be required for both safety and safety related components exposed to harsh environment.			x	The statement of paragraph 5.188 is correct. See for example the EQ recommendations of IEC 61226.

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10	EC JRC	2	5.189	Environmental qualification of components **important to safety** that must operate in harsh environments should include type testing.	Same as # 1.			x	The statement of paragraph 5.188 is correct. See for example the EQ recommendations of IEC 61226.
11	EC JRC	3	5.220	Maintenance, surveillance **and specific ageing management programs** should include activities to identify any trend towards degradation (ageing) that could result in the loss of operability of equipment	A proposal is to add the **Ageing management programmes** too, because they are especially design to detect the effects of ageing. Maintenance and surveillance typically cover active components; while ageing management programmes typically involve long lived passive components. This is in line with NS-G-1.12, which also refers to programmes that contain specific set if attributes should be credited for ageing management of SSC.	x			
12	EC JRC	4	5.236	Testing and calibration of safety system equipment should be possible in all modes of normal operations, including power operation, while retaining the capability of the **systems important to safety** to accomplish their safety functions.	Same as # 1.			x	Industry practice is to limit this to safety systems.
13	EC JRC	4	5.274	5.274. Containment penetrations should be rated: a. For continuous service at a voltage that is greater than or equal to the voltage of the systems of which the conductors are a part; b. For impulse voltages that are greater than or equal to the maximum credible transient voltage; c. To continuously carry demands from loads expected during all plant states without exceeding allowable conductor temperatures, degrading the assembly pressure boundaries; d. To safely carry short circuits over the period of time required for the protective device to clear a fault currents, accounting for credible voltage variations; and e. To withstand, without loss of mechanical integrity, the maximum possible overcurrent condition that could occur following a single random failure of devices protecting against circuit overload. d. To withstand, without loss of functionality, and without degrading the assembly pressure boundary, the maximum possible environmental loads expected during all plant states.	It appears that Item c. is more related to ensuring the assembly pressure boundary due to possible overheating rather than environmental effects during DBA. A proposal is to include new Item d. on environmental qualification of containment penetrations.			x	Paragraph 5.274 deals with electrical rating. Environmental qualification is addressed in paragraphs 5.179 to 5.180
14	ENISS	1	1	Sections associated with Safety Related AC systems marked with "*" or other annotation to point to the following note: Does not apply to the AC electrical systems of some Generation III+ plants which are designed with passive safety features.	The AP1000 electrical system does not contain any safety related AC loads. There is some degree of robustness factored into the AC electrical systems design with the intention of providing defence-in-depth functionality only. All of the electrical loads that are required to mitigate DBAs or perform other safety functions are powered solely from DC sources.			x	The application of the draft guidance to designs without safety AC power has been addressed and discussed in response to other comments on this subject. It is suspected that the comment uses the term "safety-related" with the meaning of 10CFR50 paragraph 2, not with the meaning given in the IAEA safety glossary.
15	ENISS	10	5.4	Events on the onsite power systems to be considered include, but not limited to, …	This paragraph is written twice. The redundant part is to delete.	x			
16	ENISS	11	5.13	The plant should have a diverse power supply unit (Alternate AC source) that is independent of the electrical power supply units provided for use during Operational States and Design Basis Accidents. * Does not apply to the AC electrical systems of some Generation III+ plants which are designed with passive safety features.	The AP1000 electrical system does not contain any safety related AC loads. There is some degree of robustness factored into the AC electrical systems design with the intention of providing defence-in-depth functionality only. All of the electrical loads that are required to mitigate DBAs or perform other safety functions are powered solely from DC sources.			x	Fukushima demonstrated the need for AC power to support operator actions on site and to support the operator's ability to remain on site. It is correct that the this ability should not be limited to DBA conditions but should be for Accident Conditions in general. This was changed in paragraph 5.13.

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17	ENISS	12	5.50	5.50. bis (additional to the existing) Interconnections between redundant divisions may be made during operation in case the reliability of a power supply is increased significantly and sufficient independence is ensured.	Interconnection during operation could be foreseen in 4 train design, e.g. double DC infeed (diode decoupled) to I&C and control voltage.	x	Connections between divisions may be made during operation if a safety assessment confirms the reliability of a power supply is increased significantly and sufficient independence of the redundant divisions is ensured. (for parallelism with the existing text.)		
18	ENISS	13	5.54 c	Physically separated from other components. in the same manner as the circuits of the safety division with which it is associated.	Punctuation mistake.	x			
19	ENISS	14	5.144 to 147	5.144 : Medium and low voltage AC electrical power systems should preferably be high impedance insulated grounded. 5.145 : High impedance Insulated grounding limits fault current and allows continued operation of the affected equipment. 5.146 : Other grounding solutions such as solid grounded or insulated high impedance system may be used when justified. 5.147 : In high impedance insulated grounded systems, the electrical system should be monitored for ground faults at every voltage level and allow easy identification of the failure location.	It is not understood why high impedance grounding is preferred in LV systems. Operating experience with solid grounding in Europe is very good. High impedance grounded system allows trigger action or continued operation of the affected equipment. In case of continued operation, the impedance value must be chosen in order to get a fault current compatible with personnel safety and fire protection. In return, insulated grounded system leads systematically to continued operation of the affected equipment, without risk for personnel safety and fire protection. So, to allow continued operation of the affected equipment it is more efficient to choose insulated grounded system.			x	Paragraph 5.145 gives the justification for this recommendation.
20	ENISS	15	5.276 and 5.277	5.275. The setting of the protection devices should consider the continuous current ratings and capabilities of the electrical penetrations. 5.276. A single passive protective device (e.g. a fuse) may be used if analysis of compliance with the single failure criteria shows with high confidence that a failure of that passive protective device is very unlikely and its function remains unaffected by the postulated initiating event. 5.277. A containment penetration that can indefinitely withstand the maximum current available due to a fault inside the containment does not need redundant protection. 5.2786. Conductors in containment penetrations should be protected by redundant protective devices that operate separate interrupting devices. 5.2767. A single passive protective device (e.g. a fuse) may be used if analysis of compliance with the single failure criteria shows with high confidence that a failure of that passive protective device is very unlikely and its function remains unaffected by the postulated initiating event. 5.2778. A containment penetration that can indefinitely withstand the maximum current available due to a fault inside the containment does not need redundant protection. 5.279. The penetrations should meet the same separation criteria as the cables to which they are connected.	Paragraphs to displace between 5.278 and 5.279 : this place is more convenient due to this paragraphs constitute alternative choices of paragraph 5.278.	x			
21	ENISS	16	6.9	Offsite power should be supplied by two or more physically independent offsite supplies designed and located in order to minimize, to the extent practical, the likelihood of their simultaneous failure. * Does not apply to the AC electrical systems of some Generation III+ plants which are designed with passive safety features.	The AP1000 electrical system does not contain any safety related AC loads. There is some degree of robustness factored into the AC electrical systems design with the intention of providing defence-in-depth functionality only. All of the electrical loads that are required to mitigate DBAs or perform other safety functions are powered solely from DC sources.			x	The point is already made in paragraphs 6.13 and 6.14. These two paragraphs have been combined.

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22	ENISS	17	6.33	A generator circuit breaker may be used as a means to immediately power the onsite AC power systems from the offsite circuits following a main generator trip. Generator load break switches can be used as for this purpose, but the switchover will not be immediate due to the necessary deexcitation of the generator.	Indeed, generator load break switches are not able to cut the fault current. Deexcitation of the generator allows to decrease the current value.			x	It is not clear that the proposed change would reduce confusion.
23	ENISS	2	1.3	This publication is a revision of a previous Safety Guide issued in 2004 as Safety Guide NS-G-1.8, Ref. [2], Emergency Power Systems at Nuclear Power Plants, and supersedes it. This revision takes into account the developments in the design of Emergency Power Systems in nuclear power plants and expands the scope to include all Electrical Power Systems that provide power to systems Important to Safety (see Fig. 1).	Fig. 1 shows the new scope of the guide.	x			
24	ENISS	3	1.8	The Safety Guide makes recommendations and provides guidance on the electrical power systems provisions necessary for both new and operating nuclear power plants. It applies both to all Electrical Power Systems important to safety1 in Nuclear Power Plants, including and to the preferred power supply.	As written in the draft, the preferred power supply is regarded as important to safety, which is not the case.	x			
25	ENISS	4	1.8 – Mark 1	Power systems important to safety are plant onsite electrical systems that provide power necessary for systems or components important to safety to accomplish their safety functions.– directly or via transformers, switchgear and switchyards. (see fig. 2)	According to Fig. 1 and 2, power systems important to safety are more accurately part of Onsite Power System.			x	Already inherent in the definition of important to safety. See safety glossary.
26	ENISS	5	1.9	This guide applies to all types of nuclear power plants. The extent of the electrical power systems important to safety and of safety power systems2, given by classification of the electrical systems, differs between different designs.	Spelling mistake.	x			
27	ENISS	6	1.27	The Guide includes illustrative figures, a glossary list of definitions, a bibliography and annexes. Words are used with the spellings and meanings assigned to them by the Concise Oxford Dictionary. The	The wording used in the table of contents and at page 85 is “list of definitions”	x			
28	ENISS	7	2.7	The on-site power system is composed of distribution systems and power supplies within the plant. It includes the AC and DC power supplies needed to bring a the plant to a controlled state following anticipated operational occurrences or accident conditions and to maintain it in a controlled state or safe state until off-site sources can be restored. (See Figure 1.) Stand-alone power supplies, for example separate power for security systems, are not included. The on-site power systems are separated into three different categories according to their safety significance. (See Figure 2).	Spelling and punctuation mistakes.	x			
29	ENISS	8	2.10	The preferred power supplies are the normal supplies for all plant systems important to safety. They are, if available always the first and best choice of power supply to the safety electrical power systems. The preferred power supply includes portions of both the on-site and off-site systems. (See Fig. 2).	Punctuation mistakes.	x			
30	ENISS	9	2.29	The interface between the safety systems and systems of lower safety classification should be carefully designed to ensure that there is no adverse impact on safety equipment from non safety equipment during events, normal or abnormal (see paragraph 5.8 5.4), in the electrical systems.	Wrong number of paragraph.	x			
31	Germany BMU and GRS	1	General	on-site and off-site or onsite and offsite	The spelling of the words on-site/onsite and off-site/offsite should be the same in the whole text.	x			

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32	Germany BMU and GRS	2	General	on-site power system and off-site power system or On-site Power System and Off-site Power System	The spelling of the words on-site power system/On-site Power System and off-site power system/Off-site Power System should be the same in the whole text.	x			
33	Germany BMU and GRS	3	General	fig. or Figure	The Spelling of the cites fig./Figure should be the same in the whole text.	x			
34	Germany BMU and GRS	4	2.7 last sentence	"…are separated into three different categories (preferred power supply, important to safety power supply, safety power supply) according to…"	For clarification the three different categories should be mentioned.	x	Except that sentence was referring to safety categories.		
35	Germany BMU and GRS	5	2.7	…the AC and DC power supplies needed to bring a the plant to a controlled state…	Editorial	x			
36	Germany BMU and GRS	6	5.4	delete the point once	The point 5.4 is twofold.	x			
37	Germany BMU and GRS	7	between 5.61 and 5.62	5.6x: If diverse non-electrical power systems are provided to accomplish a given safety function, their power supplies and their instrumentation and control systems should be independent of the power sources and instrumentation of the diverse power systems (electrical or other non-electrical).	Point 5.63 from Draft D should be resumed, because this sentence shows one explanation for the term 'diversity'. Furthermore in the moment point 5.62 has lost its reference.	x	It is presumed that 5.63 from Draft C was meant.		
38	Germany BMU and GRS	8	between 5.216 and 5.217	5.21x: Ageing effects must not impair the ability of safety components to function under severe environmental conditions. Such degradation might exist well before the functional capabilities under normal conditions are noticeably affected.	Point 5.218 from Draft D should be resumed, because nowhere else this requirement for aging effects is mentioned.			x	The point is already covered in paragraphs 5.180, 5,181, and 5.184
39	Germany BMU and GRS	9	between 7.26 and 7.27	7.2x: Analysis is necessary to demonstrate that safety systems comply with the single failure criterion.	Point 7.29 from Draft D should be resumed, because nowhere else this analysis is required.			x	This is already covered in paragraph 9.2.c.
40	IEC	1	General		IEC/SC45A fully supports this revision with the modification of the scope. Several experts taking regularly part to IEC/SC45A activities participated actively to review meetings and commented on the different drafts of this project. In the coming months IEC/SC45A will set up a Working Group to cover the issue of reliability of electrical systems and this revised safety guide will be considered as a basic document to be taken into account for the IEC/SC45A detailed technical standards to be developed be consistent with it.	x			
41	Pakistan PNRA	1	5.234	Design of test provisions must be coordinated with the design of the operational test program in order that availability requirements of the systems and components are fulfilled. This	Vendor's recommendations on testing frequency are based on its manufacturing experience which should be considered to ensure components availability and reliability.			x	More detailed recommendations on determining testing and test frequency are already given in NS-G-2.6.

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42	Sweden SSM	1	Generic 1	Terminology should be checked to be spelt and used in line with IAEA Safety Glossary when available Examples: -Off-site -On-site	Consistent and stringent text highly improve understanding	x			
43	Sweden SSM	2	Generic 2	Terminology important for the understanding of this guide and not yet within IAEA Safety Glossary or otherwise common knowledge shall be defined. Definitions and/or terminology use in other related IAEA standards, guides and reports (e.g. NG-T-3.8) shall as far as possible be equal (or explicitly disagreed) even if not yet in the Glossary. Examples: -Off-site Power System (new)-On-site Power System (new)-Safety Power System (new) -Important to Safety Power Supply (new)-Station blackout (See NG-T-3.8) -Use of “plant states” and their sub-divisions as defined in SSR-2/1 -elements -independence -diversity -isolation -separation	Consistent definitions and usage of terminology highly improve understanding			x	The IAEA safety glossary and the Oxford English Dictionary for the basis for terminology used in this guide.
44	Sweden SSM	3	Generic 3	Terminology used (defined or not) shall be consistent in the whole document Examples:-Alternate AC Power Source (Fig 1, 5.9, 5.13 states “Alternate AC Source”) 7.116 states “alternate supply” -Standby Power AC Source	Consistent and stringent text highly improve understanding	x	Improvement made. Note the use of the terms power source and power supply is described in paragraph 1.25.		
45	Sweden SSM	4	Generic 4	Terminology used (defined or not) shall acknowledge and as far as possible be coordinated with other important standards in similar areas, e.g. definition of “preferred power supply” in IEEE 765, which disagrees with DS 430 without any apparent reason (also differs to definition in NG-T-3.8)	Harmonization between different standards highly improve understanding			x	The source of definitions for terminology is the IAEA safety glossary.
46	Sweden SSM	5	8	“main generator” shall be deleted as being a part of PPS Example: -In section 1.6	See comments to Fig 2 below and generic 4 comment on Terminology referring to IEEE 765 above			x	**The main generator is part of the preferred power supply, as it will make it possible for the plant to ride through a number of disturbances on the grid without tripping the connection with the grid. It could be discussed if the main generator alone is a preferred power source, the guide does not imply that this is the case. §1.6 describes the whole system and §6.3 describes the answer here.**
47	Sweden SSM	6	8	“Operation modes” shall not be mixed with “plant states”	Definitions of “plant stats” as in SSR 2/1 should preferably be used as well as “Operational state” and “Accident conditions” “Operational modes” should be defined if used.Examples: -In 2.4 (also commented under 2.4)-In 2.14-In 4.9 -In 4.12 a			x	The term "mode" in the phrase operational mode is used with the definition of the Oxford English dictionary. Where used, it is referring to modes of operation of a system, or the plant not to plant states.

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48	Sweden SSM	7	7	The use of definitions and terms in the RAM (Reliability, Availability, and Maintainability) area must be overlooked and revised in the document. In the current draft these terms are not defined and not used in a consistent and stringent manner. A good base of definitions of terms in this area is IEC 60050 (191) International Electrotechnical Vocabulary (IEV) chapter 191, Dependability and quality of service.	Each of the three terms, Availability, Reliability, Maintainability has their own purpose, definition and properties. A fourth term that might be used is Maintenance Performance (Assurance of logistic resources). Availability is a performance property depending on reliability, maintainability and maintenance performance. As example para 2.14 "…. Ensure high level of reliability and availability…" or in para 5.15 (Design for reliability chapter) it states that testability and maintainability are design features for reaching reliability goals. Maintainability and reliability are design features to reach availability goals. Either the chapter shall give design recommendations for availability goals or pure reliability goals.			x	The terms availability, and reliability are defined in the IAEA safety glossary. Rapid detection and correction of failures l contribute also to reliability. Reliability of safety functions is a safety concern. Availability, is a broader concept that encompasses also availability for operation - an economic concern.
49	Sweden SSM	8	1.7	It might not be… Sentence shall be deleted	A graded approach shall always be applied and explicit exclusions shall not be elaborated on.	x	Replace by inserting statement on this topic from SSR 2/1 into the background section following paragraph 1.6. See USA comment 1		
50	Sweden SSM	9	1.9	…all types of nuclear power plants, including fuel storage facilities at the plant."	That fuel storage facilities is to be regarded as part of the scope shall be clearly pointed out initially.			x	This guide responds to the design requirements of SSR 2/1. Stand alone fuel storage facilities are under the requirements of NS-R-5. Therefore, the criteria for power systems may be somewhat different.
51	Sweden SSM	10	1.13	…of this guide. However, requirement on control of access is included.	Control of Access is a sub- section under section 5.			x	The control of access discussion in section 5 deals with control of access to electrical equipment. The systems identified in paragraph 1.13 many deal with control of access to the plant and to plant vital areas. These are outside the scope of this guide.
52	Sweden SSM	11	Fig 2	The main generator shall be shown as a dotted item	The supply of power from the main generator (rather the turbine) does not represent a reliable, and therefore preferred, source of power in operational modes where the off-site power is not available. Transition to house load is far from always successful and house load operation can often not be maintained for a longer period (due to turbine problems). However, house load operation can constitute an improvement to safety, if properly designed. This should be elaborated e.g. under section 6.			**X**	**The main generator is part of the preferred power supply, as it will make it possible for the plant to ride through a number of disturbances on the grid without tripping the connection with the grid. It could be discussed if the main generator alone is a preferred power source, the guide does not imply that this is the case. §1.6 describes the whole system and §6.3 describes the answer here. CHANGE BACK fig 2 TO ORIGINAL PPS SCOPE**
53	Sweden SSM	12	Fig 2 Note	The elements…classification Should be deleted or re formulated	The "plant safety classification" is not a stringent terminology. The classification shall be applied to all items Important to Safety	x	Changed to "plant classification scheme."		
54	Sweden SSM	13	1.28	Amended with: -GSR part 4… -NG-T-3.8… -SSR-2/1…	Regarded to be relevant	x	GSR part 4 and SSR 2/1 Added. NS-T-3.8 does not belong in paragraph 1.28 because it is not a standard. It is already cited in paragraph 6.64 and Annex I		
55	Sweden SSM	14	2.4	…provide AC power to the plant during all plant states."	"plant states" is defined in SSR-2/1 and is deemed more suitable.	x	Added plant states.		

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56	Sweden SSM	15	2.16	"Generate electric power for commercial use:" shall be deleted	Does not constitute a design consideration imposed by nuclear safety (the heading of the sub section). The generation of electric power is common knowledge for commercial NPPs.			x	Paragraph is introductory description.
57	Sweden SSM	16	2.24	Amended with: Simplicity in design shall be aimed for in order to exclude unwanted functionality and to achieve a correct functionality so that this can be completely verified. Equipment protection functions shall be designed with care not to jeopardize the safety function of Systems Important to Safety. The number of equipment protection functions (features often implemented in software) active when safety functions are called for shall be minimized.	Lessons learned			x	The need to ensure a reliable grid is a sight characteristic that is necessary for safe operation of the plant. Deep details about how the transmission system operator achieves this characteristics is beyond the scope of this guide.
58	Sweden SSM	17	2.38	National rules shall be followed. However, the following shall be observed: 2.38 Electric installations…due to high temperatures, high voltages, arcing…overcurrent, fault currents, ground currents, or any…	Regarded to be relevant. Discussion: National rules on health hazard shall always be followed but in NPP operability might be required under accident conditions which might not be regulated by the body regulating electrical equipment safety or personnel safety in general. The sub-heading Personnel and equipment safety might be need of a re-phrasing			x	It is not clear how the plant state should affect the requirement that the equipment not constitute a threat to personnel **or equipment**. **Properly designed electrical systems are essential especially under accident conditions.**
59	Sweden SSM	18	2.40	New Electrical installations shall be designed and erected in such a way that personnel who shall perform manoeuvres during all plant state do not risk injury.	Regarded to be relevant See also discussion on 2. 38 above			x	Paragraph 2.38 encompasses this recommendation
60	Sweden SSM	19	3.7	…from core, spent fuel storage, or to…	Regarded to be relevant	x	Used wording of SSR 2/1 Requirement 4		

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61	Sweden SSM	20	4.8 And generic	Transients shall be considered including internal and external events see section 5.4	Double and partly doubled requirement text shall be avoided. A more general text can be motivated for orientation or to envelope an area. Otherwise references shall be used. A general text may also include full details but is only motivated if its content is unique and covers several sub areas dealt with later, in which case these areas shall not duplicate the same text.	x	*Transients to be considered include internal events and external events including grid events that are described in paragraph 5.4.*		
62	Sweden SSM	21	4.10	…asymmetric faults, sub-synchronous resonance phenomena, large motor…lightning strikes, capacitor bank switching, and loss…	Important superposed conditions and transients	x			
63	Sweden SSM	22	4.11	…(on-site or off-site) as well as changes in loading are implemented…	Changes in the electrical loads is essential to observe as part of the design base			x	It is relatively rare that a single modification will challenge the rating in electrical equipment. It is normally cumulative effects that present a problem. Already covered by replacements and modifications. Changes in loading is a continuous process depending on pump power/ flow.
64	Sweden SSM	23	4.12 a	…from start up to maximum licensed power…	Not all licensees defines 100% as maximum licensed power	x			
65	Sweden SSM	24	4.12 a	Amended text All plant states shall be considered also including Accident conditions, which includes Design extension conditions	Lessons learned See also SSR 2/1 Definitions	x	**Change 4.12a '….and a design bases accident' to '...and accident conditions' in accordance with IAEA safety glossary**		
66	Sweden SSM	25	4.12 b	This range…used in the safety analysis of the plant.	Clarification	x		x	**No change - this part is common to safety and non-safety electrical power systems**
67	Sweden SSM	26	4.12 c	Amended text. Capacity also includes endurance time for equipment having or relying on consumable items or exhaustible stored supplies such as diesel fuel oil, lube oil, battery depletion.	Lessons learned from the stress test	x	Restated as new item s.		
68	Sweden SSM	27	4.12 d And generic	-Voltage sags…the off-site grid (both for source 1 and 2) The same also applies to other bullets and in other sections	Source 2 is often missed out			x	Some designs do not require 2 offsite supplies.
69	Sweden SSM	28	4.12 d	New built -Charging voltage for DC systems	Important design aspect	x			
70	Sweden SSM	29	4.12 d	New built-Variation of L/R in grid and accumulated load cosϕ	Important design aspect			x	The list of examples is not intended to be a complete list.
71	Sweden SSM	30	4.12 g	"Environmental conditions include…" shall be removed and suitable reference added.	See reason under 4.8			x	The short list here seems ok
72	Sweden SSM	31	4.12 j	Including test acceptance criteria and requirement for ageing management.	Logical as AM is specified in other sections			x	Ageing management is already discussed in paragraphs 5.213 to 5.226
73	Sweden SSM	32	4.12 s	New Conditions regarding fire Limitation in fire load imposed	Important design aspect			x	Fire loading is a feature comes from the internal hazards program. The need is already covered by paragraph 5.191
74	Sweden SSM	33	4.12 t	New Auxiliary system specification	Important design aspect			x	Auxiliary system specification depends upon the design of the electrical system, thus cannot be specified when establishing design basis

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75	Sweden SSM	34	4.12 u	New Restrictions in manual operation and attention imposed	Important design aspect	x	This is a plant operational philosophy question that should be an input to the design basis and result in requirements on monitoring and control. Items were added for monitoring and control.		
76	Sweden SSM	35	4.12 v	New Requirement for local manual operation	Important design aspect	x	Items were added for monitoring and control.		
77	Sweden SSM	36	5.4	New bullet -Opening of unit breaker (spurious or triggered e.g. by relay protection) in combination with a failure of relay protection or switching logic that could create unanticipated voltage transients on the safety busses originating from the main generator; 1) - when safety busses are supplied from a engineered house load operation transfer or, 2) -when a engineered safety bus power transfer to other source is prevented (applicable also if house load operation is not in design).	Lessons learned from Didelsys			x	The comment is already covered in a more general way in the bullets of paragraph 5.4.
78	Sweden SSM	37	Fig 5	-Main generator should not be part of PPS (no overlap) but the "block" (only on one side) interface line shall be shown -The overlapping of PPS with switchyard and transmission system should be illustrated e.g. as in IEEE 765 Fig 1. -Standby AC power source and DC and UPS power source should be shown to overlap with Safety power system. -Safety Related and Non Safety shall be in separate blocks -Interface line shall be shown between Safety Related and Non Safety blocks- Interface line shall be shown between Safety Related and Non Safety blocks versus Safety Power System				x	It seems that the figure already reflects all of the comments. It appears that the commenter is using the term "safety-related" with the NRC, not the IAEA definition.
79	Sweden SSM	38	5.4	Delete 2nd copy of 5.4(after Fig 5)	Repeats of 5.4	x			
80	Sweden SSM	39	5.6	Amended text Detailed stability requirements and verifications imposed by grid regulator shall also be considered as detailed in [NG-T-3.8] section 4.8.	NG-T-3.8 section 4.8.			x	NS-T-3.8 is not a guidance document.
81	Sweden SSM	40	5.8	Amended text Single Unit, Multiple Unit and Total Site SBO shall be considered.	Lessons learned from Fukushima and EU stress tests	x	International operational experience has shown that on-site and off-site AC power supplies can be simultaneously lost for a single units, for multiple units on one site, or for all units on one site.		
82	Sweden SSM	41	5.11	…parameters and power for lighting…	Clarification	x			
83	Sweden SSM	42	5.14-5.74	The text about redundancy, independence, diversity and CCF must be overlooked. See also comment Generic 2.	As example diversity is a mean to reach independence to avoid CCF. This and other guidelines are not consistent in 5.14-5.74.			x	**A general statement given in annex I is that incomplete design bases cannot be solved by redundancy or diversity. The theme of this guide is to underline the need for correct design bases.**
84	Sweden SSM	43	5.17	…also increases the probability for spurious maloperation.	Clarification			x	Spurious operation is the commonly used term
85	Sweden SSM	44	5.20	Modification of start o sentence Additional redundancy within a train or division improve operational flexibility…	This outcome can be showed/proven by availability analysis and verified by experience.			x	The proposed change appears to neither change the meaning of the text nor improve clarity
86	Sweden SSM	45	5.30	5.30 shall be deleted	Text constitutes part of 5.29			x	5.30 is explanatory text and, as such, is separated from the normative text. Some simplification of the language was made.

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87	Sweden SSM	46	5.31	Shall be deleted or reformulated in order to avoid double writing of requirements	See generic comment under 4.8 Examples of more details on the same subject are also given in 5.21 and 5.24			x	Paragraphs 5.24 and 5.31 are explanatory, not normative text. As they have no recommendations they are not a double writing of recommendations. Paragraph 5.21 is a quote of SSR 2/1 and may not be revised in the safety guide.
88	Sweden SSM	47	5.35	Second bullet, word missing…might also ??? in conjunction…		x	Environmental, seismic, and electromagnetic qualification may also be used by themselves, or in conjunction with physical separation, to protect against the effects of accidents, internal hazards, or external hazards.		
89	Sweden SSM	48	5.40	8 th bullet -The plant process computer system.	Clarification	x			
90	Sweden SSM	49	5.96	All equipment used in Plant Power Systems should be robust, which includes having a sufficient margin between the nominal ratings of parameters and the most extreme values of these parameters, in the plant states where the equipment is assumed in the design analysis not to fail.	Text should be coordinated with 2.23 and 2.24 and made clearer			x	The proposed text is less clear and obscures the main point of rating. The explanatory text of 2.23 and 2.24 is a statement of a general concept that relates to many of the recommendations in the safety guide.
91	Sweden SSM	50	5.98	…, all plant modifications and Periodic…	Even smaller changes in the plan, e.g. changes in the loads, will affect the margins.“(including changes in loads)” could be added in the text for clarity.			x	It is relatively rare that a single modification will challenge the rating in electrical equipment. It is normally cumulative effects that present a problem.
92	Sweden SSM	51	5.111	Sustained overloading above continuous rating…	Transient overloading e.g. from starting currents as a result of normal successful sequencing, need not to be indicated in the control room.			x	The paragraph deals with sustained overloading. Motor starting is not a sustained overload.
93	Sweden SSM	52	5.231	No. 4 Ref. [17], 13 Ref. [18], 17 Ref. [new1] and 17 Ref. [new2] give guidance… Note: The section “References” should be amended with “new1” IAEA Nuclear Security Series 10, Development, Use and Maintenance of the Design Basis Threat and “new2” IAEA Nuclear Security Series 17, Computer Security at Nuclear Facilities	IAEA Nuclear Security Series 10 Development Use and Maintenance of the Design Basis Threat” should be referenced as security based design requirements are applicable for power systems. No 17 “Computer Security at Nuclear Facilities” should be referenced as digital systems often are essential parts of power systems.			x	Development of the design basis threat is not commonly in the domain of electrical power system staff. Indeed, in some member states the electrical design and operations staff will not have access to the DBT for security reasons. The design, must nevertheless respond to security requirements that have been identified using the DBT. Electronic equipment for electrical power systems is in the Domain of DS-431, which references NSS 17.
94	Sweden SSM	53	5.261	Amended text Possibility for interconnections between reactor units may be designed for use in Station Blackout conditions provided the interconnections have interlocks or other physical arrangements that cannot be defeated by simple switch operation. These interconnections may only be utilized after a safety assessment that confirms that the effect of these interconnections on the reliability of plant safety functions and their vulnerability to common cause failure is acceptable.	Provides further (in addition to alternate AC source) engineered means of coping with a SBO.			x	This topic is addressed in paragraph 5.216. Fu
95	Sweden SSM	54	"List of definitions 2 "	Preferred power supply. The power supply from the transmission system to the Safety Power Supply that is preferred to furnish power at all plant states when power is not furnished from the main generator.	The definition shall use terminology explained in the document or in definitions (preferably both). A certain harmonization with other standards is also desirable (e.g. IEEE 765). It is though proposed that the PPS also is the preferred power supply under non-accident conditions (contrary to IEEE 765)			x	The proposed text convolves a definition and an explanation.

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96	Sweden SSM	55	"List of definitions 2 "	Station blackout. A condition in which a nuclear unit loses all electrical power supply from the grid system (LOOP), the reactor and generator have tripped, and the onsite AC power sources (typically diesel generators) have all failed to start or have tripped off.	The definition of NG-T-3.8 quoted is clearer e.g. the alternate AC power, referred to as not available in the “old” definition, is part of the on-site power system and is still referred to as “can be available”.			x	**NO CHANGE NG-T-3.8 definition is good for that document, in this guide there is a need to be more precise about the availability of different power supplies**
97	Sweden SSM	2	5.246	Following items may also be included as bullets in para 5.246: Ensure proper isolation during testing in order to minimize their actuation. Wherever possible, include provision to perform tests on staggered basis, especially on the redundant trains of safety equipment in order to ensure system availability during plant operation or as needed. Also include the provision of overriding signal, i.e. safety signal should be given due priority during equipment testing to make sure that the system remained available when required.	Improper isolation causes unnecessary challenges. Ensuring higher availability of safety systems A A A A Safety signals should be given higher priority and the design should include provisions to override test mode if so required.	x	Added to the provisions for removal from service "Provisions for removing electrical equipment from service should ensure the equipment is properly isolated in order to protect the safety of operational personnel and to avoid spurious operation." Paragraph 5.235 seems already to address the need to ensure continued operation of safety features. It does not preclude the use of an overriding signal. The potential for adding complexity to implement an override function argues against making this a recommendation. The decision to stagger tests is a decision for operations and the guidance of NS-G-2.6 would apply.		
98	Sweden SSM	2	5.246	Following items may also be included as bullets in para 5.246: Ensure proper isolation during testing in order to minimize their actuation. Wherever possible, include provision to perform tests on staggered basis, especially on the redundant trains of safety equipment in order to ensure system availability during plant operation or as needed. Also include the provision of overriding signal, i.e. safety signal should be given due priority during equipment testing to make sure that the system remained available when required.	Improper isolation causes unnecessary challenges. Ensuring higher availability of safety systems A A A A Safety signals should be given higher priority and the design should include provisions to override test mode if so required.			x	Added to the provisions for removal from service "Provisions for removing electrical equipment from service should ensure the equipment is properly isolated in order to protect the safety of operational personnel and to avoid spurious operation." Paragraph 5.235 seems already to address the need to ensure continued operation of safety features. It does not preclude the use of an overriding signal. The potential for adding complexity to implement an override function argues against making this a recommendation. The decision to stagger tests is a decision for operations and the guidance of NS-G-2.6 would apply.
99	Switzerland ENSI	CH1	Sheet 11 / Fig. 3	Take out from this picture on DC the voltage level. Reason in Europe a Plant I&C never is connected 120/240 V DC. Also delete the DC/DC converter between 120/240 V DC and 12/16V DC.	Figures should be representative for several NPP`s and not dedicated to one type. Also on all other pictures no voltage level is shown. Information: we have different batteries for 24/48 V DC and 120 or 220 V DC level.			x	The figure is an example. There are many differences between this figure and the specific design of many plants. It is not possible to make a fully generic drawing such at this. Nevertheless, such a drawing is considered useful for illustrating various elements that may be found in a electrical power system.
100	Switzerland ENSI	CH2	Sheet 14, last bullet, last part of the sentence	., and include a bypass circuit to allow for maintenance and emergency cases feeding safety loads ….	Should be not allowed during normal operation of the plant.			x	It is a widely used practice to allow one division of uninterruptable power to be fed from safety AC via a voltage regulating transformer.
101	Switzerland ENSI	CH3	Sheet 15, 2.18 Definition for stable and reliable is missing.	E.g. You can take a text passage from No. NG-T-3.8 (sheet 12): A Stable and reliable grid would be one where voltage and frequency are controlled within pre-defined limits and disconnections are infrequent events. Typical values are: - Frequency is controlled within +/-1% of nominal frequency for the majority of the time. - Voltage is controlled within +/- 5% of the nominal value on the high voltage transmission system for the majority of the time. - Events that disconnect parts of the grid, or lead to blackout of major part of the grid are rare (much less than once per year). This applies particularly tot that part of the grid to which the NPP is connected. - The grid recovery following regional a regional blackout restores power for essential services, incl. offsite power for NPP`s, in less than two hours.	If you give no information about the values what you expect from a stable a reliable grid the grid code will be change in a way which is not a safe direction for NPP`s (tendency weaker). Also we get information, that experts expect for the future that grid in Europe will trip more than once per year.			x	IAEA safety guides generally avoid giving numerical acceptance criteria. **The need to ensure a reliable grid is a sight characteristic that is necessary for safe operation of the plant. Deep details about how the transmission system operator achieves this characteristics is beyond the scope of this guide**

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102	Switzerland ENSI	CH4	Sheet 29, 5.54 character c	Physical separated from other components in…..	Make instead of the point a blank after components.	x			
103	Switzerland ENSI	CH5	Sheet 30, 5.72	When the safety power systems as a result are divided into different divisions and designing / installation was correct, one single electrical event cannot challenge redundant division.	If we think about scenarios like in Forsmark or Fukushima redundancies and diversity does not help against design faults and results in a CCF. Delete the sentence “However the starting… has a potential for common cause failure…. “			x	The paragraph is referring to electrical events not natural phenomena hazards. Furthermore, the paragraph is referring to a condition where the safety power systems have been isolated from each other. Therefore, neither the Forsmark nor the Fukushima experience is relevant to the statement of this paragraph.
104	Switzerland ENSI	CH6	Sheet 34, 5.117		Add a value as an example to the transient voltage level.			x	IAEA safety guides generally avoid giving numerical acceptance criteria.
105	Switzerland ENSI	CH7	Sheet 35, 5.129 character c	…..and the impulse rating greater than any transient voltage (e.g. 130%) to which the equipment might be subjected transient Medium voltage power cables (from 1kV to 35 kV).	The high value for medium voltage was not correct. Acc. IEEE Std. 1623-2004 or DIN IEC 60038 is from 1 kV to 35 kV.			x	The transient voltage rating should be determined by analysis. The value for medium voltage will be adjusted.
106	UAE	1.	General	Proposed Guide does not cover “Fukushima” lessons learnt	A few modifications and improvements to electrical systems are already considered addressing findings of Fukushima accident analysis - e.g. cross ties of units emergency busbars (EDGs)”, mobile DG generators, extended SBO coping time and battery capacity, etc. Major changes to this guide are required otherwise DS 430 would become outdated from day one after publication.			x	The changes to be made in safety standards as a result of Fukushima experience are still under examination. An update is expected when this effort is completed. That Fukushima is not yet included will be explained in introductory material as was done for SSR 2/1
107	UAE	2.	1.9	…systems important to safety…	Editorial	x			
108	UAE	3.	3.7	…from the core and spent fuel store, or to limit….	Cooling of spent fuel is also a fundamental safety function as per SSR-2/1 requirement 4	x	Used wording of SSR 2/1 Requirement 4		
109	UAE	4.	5.4	Whole paragraph is duplicated (page 22 and 23)	Editorial	x			
110	UAE	5.	9.1 (pg 67)	Requirements of GS-R-3, Ref. [14]	Editorial	x			

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111	Ukraine SSTC	1	8	8. ALTERNATE AC POWER SUPPLIES Propose to add the next paragraph at the end: "Design should specify corrective and preventive measures taking into account the assessments of safety analysis with regards to alternate independent AC power supplies (AIPS). In particular: Minimum required capacity of AIPS, based on minimal configuration of equipment which is necessary for the safe shutdown of power unit; Requirements for AIPS locations; Technical requirements on arrangement and conditions on long-term operation; Storage conditions for AIPS; Transport routes for AIPS (mobile power supplies) from the storage location to connection point, in case of accident initial events at NPP site; Locations (schematic, diagrams) for AIPS connections to corresponding grids (sections of safety trains); Procedures for AIPS connections to the sections of safety trains and activities of personnel on monitoring AIPS parameters."	To enhance the background of this section in the highlight of Fukushima lessons.			x	The changes to be made in safety standards as a result of Fukushima experience are still under examination. An update is expected when this effort is completed. That Fukushima is not yet included will be explained in introductory material as was done for SSR 2/1
112	Ukraine SSTC	2	1.7	Add the phrase to the end of paragraph: "Although the efforts should be applied to minimize the amount of such noncompliant cases".	Current paragraph ends with the phrase: "It might not be practicable to apply some of the recommendations of this Safety Guide to plants that are already in operation or under construction". The proposed addition focuses the goal to improve current design of the plants even if the changes in the design are not practical. The changes might happen to be practical in future or after changes of priorities.	x	Replace by inserting statement on this topic from SSR 2/1 into the background section following paragraph 1.6. See USA comment 1		
113	Ukraine SSTC	3	After 5.184	Additional paragraph to add: "The qualification of electrical components of specific systems might extend to abnormal, accident or beyond design conditions. The components of systems intended for use in severe accident management should have extended qualification. The intended survivability of the components under these conditions should be clearly specified and be commeasured with accident management timings"	This part of the Guide specifies equipment qualification. Based on the extended experience and possible use of components the requirements to extend qualification to beyond design conditions for specific items are required. The lifetime of equipment under severe conditions should be clearly specified and be of order of supposed purpose action timings.			x	The existing paragraph already addresses the stated issue. It recommends qualification to show that the safety function can be performed under the full range of environmental conditions. If equipment has a safety function during DEC it must be qualified. If it does not have a safety function under DEC then the environmental conditions for such events are not relevant.
114	Ukraine SSTC	4	After 5.184	Additional paragraph to add: "It might be not practical to extend the qualification to beyond design harsh environment conditions for all safety classified power system components. The minimal set of such equipment should be identified and qualified"	This proposed item limits the need in qualification for harsh environment conditions to certain group of vital equipment. It is not necessary that ALL safety equipment be qualified for beyond design conditions.			x	The existing paragraph already addresses the stated issue. It recommends qualification to show that the safety function can be performed under the full range of environmental conditions. If equipment has a safety function during DEC it must be qualified. If it does not have a safety function under DEC then the environmental conditions for such events are not relevant.
115	Ukraine SSTC	5	General	It is proposed to add throughout the text the reference on performing safety functions for spent fuel pool as well as for core, e.g. "3.7. Safety functions, systems, and components are those provided to ensure the safe shutdown of the reactor or the residual heat removal from the core and spent fuel pool, or to limit the consequences of anticipated operational occurrences (AOO) or design basis accidents (DBA)".	Lesson learnt from the Fukushima accident	x	Revised to conform with SSR 2/1 requirement in this area. Note that some recommendations that are important for core core cooling are not applicable to spent fuel cooling.		

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116	USA USNRC	1	1.7 Objective	The Guidance stated on page 7: "It might not be practicable to apply some of the recommendations of this Safety Guide to plants that are already in operation or under construction." In this context, the guidance needs to clarify this expectation. Perhaps the full statement in SSR-2/1, Section 1.3 can be slightly modified and used. Also, following SSR-2/1, it may best fit in the background section.	Clarification of objective and scope. Revision here, or at some other appropriate place is needed to indicate what is deemed to be applicable, and what is not.	x			
117	USA USNRC	10	5.4	Add: Harmonics due to switching surges or rotating equipment Loss of single phase or open phase condition	Operating experience in USA	x	**Add: 'Harmonics due to switching surges or rotating equipment'. Single phase is already covered**		
118	USA USNRC	11	5.179	5.179. In this guide environmental qualification is qualification for temperature, pressure, humidity, chemical exposure, radiation, dust storms, frost/snow, submergence, and ageing mechanisms that might affect the proper functioning of components under those conditions.	For completeness, we recommend adding "dust storms, frost, and snow." to the list of environmental qualification conditions. Given that items external to buildings are covered, these types of considerations may be important.	x	Added meteorological conditions		
119	USA USNRC	12	8.1	Section 8 provides guidance for an acceptable way to cope with station blackout (SBO) conditions. A new 8.1 should provide the link to the appropriate SBO requirement in SSR-2/1.	The ability to cope with station blackout is an important design extension condition. Fukushima events emphasized its importance, as well as the ability to cope with extended SBO conditions. If a clear SSR-2/1 requirement cannot be found, it should be added to the DPP for Fukushima lessons learned (DS462).			x	SSR 2/1 has no explicit requirements relating to SBO. Annex 1 of the safety guide, however, describes how AAC fits into the defence in depth provided in the electrical power systems.
120	USA USNRC	13	8.2	Replace it with following: "Alternate AC power supplies are provided to protect the electrical systems against the simultaneous failure of offsite and emergency on-site AC power supplies. This involves AC power sources that are diverse in design and not susceptible to the events that caused the loss of onsite and offsite power sources."	Editorial	x			
121	USA USNRC	14	Annex II, Para II-5. "Short Circuit Studies"	Amend the paragraph to clearly define "stability of system operation" in terms of timely clearance of fault by protective action supporting continued operation remaining electric system. Also, amplify the need to update fault studies for changes in the offsite power system including changes to grid available fault current based on grid modifications.	Provide clarity in understanding of the meaning of stability Make clear that awareness of grid changes affecting grid available fault current need to be considered.	x			
122	USA USNRC	15	General	DS430 text was presented in a format of numbered paragraphs. Certain paragraphs were designated with "bold text," while others were not. It is unclear what is the significance of having different styles of presentation of the text.	Style, edit, and consistency in presentation of the document.			x	Please read paragraph 1.26
123	USA USNRC	16	1.9	This guide applies to all types of nuclear power plants. The extent of the electrical power systems important to safety…	Typographical	x			
124	USA USNRC	17	1.11	Figures 1, 2 and 3 show examples of Nuclear Power Plant	Editorial	x	Original wording was ok. Change was neverthe less accepted and system changed to systems.		

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125	USA USNRC	18	2.7	Stand-alone power supplies, for example such as separate power for security systems, are not included.	Editorial	x			
126	USA USNRC	19	3.1	The design shall be such as to ensure that any interference between items important to safety will be prevented, and in particular	Editorial (Note, this is a repeated statement)			x	Paragraph 3.1 is a quote of SSR 2/1 and is not open for revision in the safety guide.
127	USA USNRC	2	2.4	The off-site power system will ideally should be designed to provide AC power to the plant during all modes of operation.	Clearly define the main purpose of offsite power design			x	The introductory part of section 2 is intentionally informative. The desired normative statement is already made in paragraph 6.15 within the section that deals with recommendations for off site power systems.
128	USA USNRC	20	5.4	5.4 is repeated in the document	Editorial	x			
129	USA USNRC	21	5.20	The availability of spare components such as an uninterruptible power supply, or battery charger, might precludes operating restrictions in the event of a failure or maintenance related outage of these critical components	Editorial			x	Might is correct. It also might not
130	USA USNRC	22	5.35	Might Protects against common cause failure due to common normal, abnormal, or accident environments, the effects	Editorial			x	Physical separation will not always protect against these effects, hence the term might.
131	USA USNRC	23	5.35	Might Reduces the likelihood of common cause failures	Editorial			x	Physical separation will not always protect against these effects, hence the term might. It didn't work at Fukushima.
132	USA USNRC	24	6.49	It needs to be taken into account that The operation of Nuclear power plants requires particular coordination between Transmission System Operator and nuclear power plant operator	Editorial	x			
133	USA USNRC	3	2.8	include the plant main generator, plant generator step up transformer, auxiliary transformer, standby transformer and the distribution system	Editorial	x			
134	USA USNRC	4	2.9	Protective relays detect The loss of the preferred AC power supply to the Electrical Power Systems triggers and auto the startup of a the standby electrical power source. In most cases the plant safety analyses assume that the standby AC power source will be used for plant shutdown following design basis accidents, as this source has limited capacity and a time delay associated with powering the safety busses.	Provide reason why the onsite power source is used in safety analyses.	x			
135	USA USNRC	5	2.30	Electrical systems powering equipment important to safety – directly or via transformers, switchgear and switchyards – that are connected to equipment not important to safety (that is, equipment not required for prevention of abnormal operation or for mitigating the consequences of failures or accident conditions) should preferably be isolated from standby power sources during accident conditions.	The comment as written should be modified for clarity			x	Deleted paragraph in response to other comments
136	USA USNRC	6	Para 2.35 Note 5 on pg 17	Amend the note to include discussion of how the TSO also ensures reliable electric power to the nuclear power plant as well as transmitting its power to the regional or local electric distribution operators	Grid power's importance to the proper operation of safety equipment in the nuclear power plant	x	Added to paragraph 2.36		
137	USA USNRC	7	2.39	2.39. Electrical installations should be designed and erected in such a way that they can withstand voltages that can be expected to occur in the installation system during all modes of operation	Editorial for clarity	x	Electrical systems should be designed and erected in such a way that they can withstand voltages that can be expected to occur in any plant state or operating mode.		

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138	USA USNRC	8	4.10	and loss of transmission system elements, including single phase open conditions	Operating experience in USA	x			
139	USA USNRC	9	4.12b	This range defines the operating requirements for equipment such as motors, for pumps, inverters, battery chargers and valve actuators (used in the accident analyses (safety analyses) of the plant) where performance characteristics are adversely impacted when operating outside the allowable band.	Rewritten to offer clarity and reason for evaluating the allowable band	x	Added additional examples of equipment and deleted discussion of safety analysis and it seemed incoherent.		
140	WNA/CORDEL	1	1	Sections associated with Safety Related AC systems marked with "*" or other annotation to point to the following note: Does not apply to the AC electrical systems of some Generation III+ plants which are designed with passive safety features.	The AP1000 electrical system does not contain any safety related AC loads. There is some degree of robustness factored into the AC electrical systems design with the intention of providing defence-in-depth functionality only. All of the electrical loads that are required to mitigate DBAs or perform other safety functions are powered solely from DC sources.			x	The application of the draft guidance to designs without safety AC power has been addressed and discussed in response to other comments on this subject. It is suspected that the comment uses the term "safety-related" with the meaning of 10CFR50 paragraph 2, not with the meaning given in the IAEA safety glossary.
141	WNA/CORDEL	2	1.3	This publication is a revision of a previous Safety Guide issued in 2004 as Safety Guide NS-G-1.8, Ref. [2], Emergency Power Systems at Nuclear Power Plants, and supersedes it. This revision takes into account the developments in the design of Emergency Power Systems in nuclear power plants and expands the scope to include all Electrical Power Systems that provide power to systems Important to Safety (see Fig. 1).	Fig. 1 shows the new scope of the guide.	x			
142	WNA/CORDEL	3	1.6 line 4	"…part of the offsite power system. (e.g.,…."	Delete period after systems. It is not necessary	x			
143	WNA/CORDEL	4	1.6 line 7	"…supplies will be a plant-specific decision."	Add period at the end of the sentence	x			
144	WNA/CORDEL	5	1.8	The Safety Guide makes recommendations and provides guidance on the electrical power systems provisions necessary for both new and operating nuclear power plants. It applies both to all Electrical Power Systems important to safety1 in Nuclear Power Plants, including and to the preferred power supply.	As written in the draft, the preferred power supply is regarded as important to safety, which is not the case.	x			
145	WNA/CORDEL	6	1.8 – Mark 1	Power systems important to safety are plant onsite electrical systems that provide power necessary for systems or components important to safety to accomplish their safety functions.– directly or via transformers, switchgear and switchyards. (see fig. 2)	According to Fig. 1 and 2, power systems important to safety are more accurately part of Onsite Power System.			x	Comment unclear. It appears to be a request to modify text that does not exist in the version of the document that was submitted for review.

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#	Reviewer	No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted but Modified as Follows	Rejected	Reason for rejection / modification
146	WNA/CORDEL	7	1.9	This guide applies to all types of nuclear power plants. The extent of the electrical power systems important to safety and of safety power systems2, given by classification of the electrical systems, differs between different designs.	Spelling mistake.	x			
147	WNA/CORDEL	8	1.27	The Guide includes illustrative figures, a glossary list of definitions, a bibliography and annexes. Words are used with the spellings and meanings assigned to them by the Concise Oxford Dictionary. The English text is the authoritative version.	The wording used in the table of contents and at page 85 is “list of definitions”	x			
148	WNA/CORDEL	9	2.4	The border between on-site and off-site power systems is normally in the high voltage breakers closest to the plant. in the high voltage breakers closest to the plant. At the high voltage bushings of the Main Step-up Transformers.	Most utilities establish the plant/switchyard interface at the MSUs although the electrical isolation boundary is the PCBs in the EHV switchyard.	x	The boundary between on-site and off-site power systems is at the point where the items controlled by the transmission system operator connect to equipment controlled by the NPP operator. This boundary is often at the step up bushings of the transformers that connect to transmission voltages or in the high voltage breakers closest to the plant		
149	WNA/CORDEL	10	2.7	The on-site power system is composed of distribution systems and power supplies within the plant. It includes the AC and DC power supplies needed to bring a the plant to a controlled state following anticipated operational occurrences or accident conditions and to maintain it in a controlled state or safe state until off-site sources can be restored. (See Figure 1.) Stand-alone power supplies, for example separate power for security systems, are not included. The on-site power systems are separated into three different categories according to their safety significance. (See Figure 2).	Spelling and punctuation mistakes.	x			
150	WNA/CORDEL	11	2.10	The preferred power supplies are the normal supplies for all plant systems important to safety. They are, if available always the first and best choice of power supply to the safety electrical power systems. The preferred power supply includes portions of both the on-site and off-site systems. (See Fig. 2).	Punctuation mistakes.	x			
151	WNA/CORDEL	12	2.27	Measures should be taken to protect the electrical systems against common cause failures (CCF) this includes protection of the electrical systems from catastrophic failure due to a potential aircraft impact.	One potential cause of a CCF of the electrical system is an intentional or unintentional strike by an aircraft of the NPP electrical building housing key components of the electrical system. This needs to be prevented in the design basis of the electrical system/electrical building.			x	Aircraft crash is already address by reference to NS-G-1.5 given in paragraph 5.194
152	WNA/CORDEL	13	2.29	The interface between the safety systems and systems of lower safety classification should be carefully designed to ensure that there is no adverse impact on safety equipment from non safety equipment during events, normal or abnormal (see paragraph 5.8 5.4), in the electrical systems.	Wrong number of paragraph.	x	Deleted cross reference		
153	WNA/CORDEL	14	5.4	Solar activity and geomagnetic induced currents *associated with the design of the transformers that interface the HV switchyard.	This requirement deals more with HV & EHV transformers than the onsite power systems. There is not an IEEE or IEC requirement for GIC in transformers designs yet.			x	No change, **this is a general design guideline that points at different events that could as a result have an impact on the on-site systems**

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154	WNA/CORDEL	15	5.4	Remove one of the section 5.4s.	Section 5.4 is listed twice.	x			
155	WNA/CORDEL	16	5.4	Events on the onsite power systems to be considered include, but not limited to, …	This paragraph is written twice. The redundant part is to delete.	x			
156	WNA/CORDEL	17	5.4	5.4. Events on the onsite power systems to be considered include, but not limited to, ・Switching and lightning surges ↓(abbr) ・Solar activity and geomagnetic induced currents Comment The article is repeatedly (twice) written on page 22 and 23 to 24, so either one should be deleted.	It seems to be just an editorial error.	x			
157	WNA/CORDEL	18	5.9a	The transmission system, switchyard, electrical systems, safety class electrical power system and on-site safety-related electrical power distribution system shall be evaluated for all design basis seismic, design basis flooding and beyond design basis external events that could lead to an extended station blackout (SBO) from a CCF of these systems. Enhanced mitigation measures shall be designed into these systems and the plant to cope with an SBO for an extended period beyond the design basis.	In light of the Fukushima accident, a new requirement is necessary to analyse the response of the electrical systems to probable beyond design basis external events and to add protective features to cope with these events.			x	This revision of the guide is not intended to address Fukushima lessons learned. This will be explained in the introduction. A new revision is expected after Fukushima lessons are better understood.
158	WNA/CORDEL	19	5.35, 3rd bullet	Might reduce the likelihood of common cause failures as a result of events that have localized effects (e.g., tornado, or tsunami or aircraft impact).	To include the potential CCF caused by an aircraft crash.	x			
159	WNA/CORDEL	20	5.54 c	Physically separated from other components. in the same manner as the circuits of the safety division with which it is associated.	Punctuation mistake.	x			
160	WNA/CORDEL	21	5.54c	"…other components. in the same manner …"	Delete period between "components" and "in". It's not necessary.	x			
161	WNA/CORDEL	22	5.123 line 2	"…more than is justified in…"	Add "is". This is required for understanding.	x			
162	WNA/CORDEL	23	5.13	The plant should have a diverse power supply unit (Alternate AC source) that is independent of the electrical power supply units provided for use during Operational States and Design Basis Accidents. * Does not apply to the AC electrical systems of some Generation III+ plants which are designed with passive safety features.	The AP1000 electrical system does not contain any safety related AC loads. There is some degree of robustness factored into the AC electrical systems design with the intention of providing defence-in-depth functionality only. All of the electrical loads that are required to mitigate DBAs or perform other safety functions are powered solely from DC sources.			x	Fukushima demonstrated the need for AC power to support operator actions on site and to support the operator's ability to remain on site. It is correct that the this ability should not be limited to DBA conditions but should be for Accident Conditions in general. This was changed in paragraph 5.13.

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163	WNA/CORDEL	24	5.144 to 147	5.144 : Medium and low voltage AC electrical power systems should preferably be high impedance insulated grounded. 5.145 : High impedance Insulated grounding limits fault current and allows continued operation of the affected equipment. 5.146 : Other grounding solutions such as solid grounded or insulated high impedance system may be used when justified. 5.147 : In high impedance insulated grounded systems, the electrical system should be monitored for ground faults at every voltage level and allow easy identification of the failure location.	High impedance grounded system allows trigger action or continued operation of the affected equipment. In case of continued operation, the impedance value must be chosen in order to get a fault current compatible with personnel safety and fire protection. In return, insulated grounded system leads systematically to continued operation of the affected equipment, without risk for personnel safety and fire protection. So, to allow continued operation of the affected equipment it is more efficient to choose insulated grounded system.			x	Paragraph 5.145 gives the justification for this recommendation.
164	WNA/CORDEL	25	5.170 line 2	"…it must be shown to. be…"	Delete period after "to"….It is not necessary	x			
165	WNA/CORDEL	26	5.205	Add this new bullet to the list: Man made EM pulses intended to disrupt electronic devises, electrical systems and components.	Electronic interference as a result of handle held EM pulse generators need to need considered in the design of the electrical systems.			x	Reference is believed to be to 5.204, not 5.205. The list of paragraph 5.204 is not representative as exhaustive. The criteria for EMP devices are still evolving and it seems premature to include a specific class of devices, e.g., handheld. It is not clear that the concern is limited to handheld devices.
166	WNA/CORDEL	27	5.274c line 2	"…temperatures, or degrading the …"	Delete comma and add "or" as indicated. This provides clarity to requirement.	x			
167	WNA/CORDEL	28	5.276 and 5.277	5.275. The setting of the protection devices should consider the continuous current ratings and capabilities of the electrical penetrations. 5.276. A single passive protective device (e.g. a fuse) may be used if analysis of compliance with the single failure criteria shows with high confidence that a failure of that passive protective device is very unlikely and its function remains unaffected by the postulated initiating event. 5.277. A containment penetration that can indefinitely withstand the maximum current available due to a fault inside the containment does not need redundant protection. 5.2786. Conductors in containment penetrations should be protected by redundant protective devices that operate separate interrupting devices. 5.2767. A single passive protective device (e.g. a fuse) may be used if analysis of compliance with the single failure criteria shows with high confidence that a failure of that passive protective device is very unlikely and its function remains unaffected by the postulated initiating event. 5.2778. A containment penetration that can indefinitely withstand the maximum current available due to a fault inside the containment does not need redundant protection. 5.279. The penetrations should meet the same separation criteria as the cables to which they are connected.		x			
168	WNA/CORDEL	29	6.8	Add this new bullet to the list: Beyond design basis external events possible at the site (seismic, flooding etc.)	In light of the Fukushima accident seismic and flooding events should be called out as bullets to this requirement.			x	This revision of the guide is not intended to address Fukushima lessons learned. This will be explained in the introduction. A new revision is expected after Fukushima lessons are better understood.
169	WNA/CORDEL	30	6.9	Offsite power should be supplied by two or more physically independent offsite supplies designed and located in order to minimize, to the extent practical, the likelihood of their simultaneous failure. * Does not apply to the AC electrical systems of some Generation III+ plants which are designed with passive safety features.	The AP1000 electrical system does not contain any safety related AC loads. There is some degree of robustness factored into the AC electrical systems design with the intention of providing defence-in-depth functionality only. All of the electrical loads that are required to mitigate DBAs or perform other safety functions are powered solely from DC sources.			x	The point is already made in paragraphs 6.13 and 6.14. These two paragraphs have been combined.

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170	WNA/CORDEL	31	6.33	A generator circuit breaker may be used as a means to immediately power the onsite AC power systems from the offsite circuits following a main generator trip. Generator load break switches can be used as for this purpose, but the switchover will not be immediate due to the necessary deexcitation of the generator.	Indeed, generator load break switches are not able to cut the fault current. Deexcitation of the generator allows to decrease the current value.			x	It is not clear that the proposed change would reduce confusion.
171	WNA/CORDEL	32	6.33 line 3	"…used as for this purpose, but…"	Delete "as"...it is unnecessary.	x			
172	WNA/CORDEL	33	6.49 line 4	Therefore, it is important to established a precise a channel of communications, operative operating procedures and preferred corridors to supply energy to the nuclear power plant during shutdowns or accident conditions.	Changes are required for clarity of the requirement.	x			
173	WNA/CORDEL	34	6.49 line 2	"…coordination between the Transmission System Operator and the nuclear power plant operator.	Add "the" (two places) for proper sentence structure.	x			
174	WNA/CORDEL	35	7	For Generation III+ plants which contain passive safety features, the AC electrical power system should be designed to provide reliable power for defence-in-depth functions that supplement and reduce the challenges to the passive safety systems.	Add a bullet that emphasizes the design considerations for AC power systems in Generation III+ NPPs.	x	Added to the section 5 discussion of safety related stand by AC sources: "Plants which do not require safety classified standby AC power sources should have safety related standby sources to provide reliable power for defence-in-depth functions that supplement and reduce the challenges to the safety systems."		
175	WNA/CORDEL	36	7.102a line 4	"…250 ms., and when faults happen…"	Delete period after 250 ms...it's not necessary.	x			
176	WNA/CORDEL	37	7.14 line 2	"…should meet the following criteria.: …"	Delete period and insert a ":" since what follows is a list.	x			
177	WNA/CORDEL	38	7.36	7.36. For NPPs with active ECCS systems, emergency Standby power sources should consist of an electrical generating unit complete with all auxiliaries and dedicated separate and independent stored energy supply for both starting and running the prime mover.	Changes made for clarification. The original requirement assumes that the NPPs ECCS systems are active systems and in a LOCA emergency power requires the starting of an EDG or CTG (prime mover). This does not apply to passive plants that rely on divisions of battery banks as their stand by power sources.			x	Paragraph applies to safety standby supplies. Passive plants my not need safety classified standby supplies. In that situation this subsection will not apply. The need for standby safety standby supplies to power ECCS system may not apply to certain reactor technologies, e.g. gas reactors or LMR.
178	WNA/CORDEL	39	7.36a	7.36a For NPPs with passive ECCS systems, emergency standby power should consist of independent/redundant divisions of battery banks, battery charges and distribution systems with dedicated auxiliary systems (ventilation) as required to supply divisional safety loads.	Required to cover passive plant emergency standby battery power requirements.			x	Paragraph 7.36 deals with safety standby AC supplies. The discussion of safety-related stand by supplies (which may be the system for passive plants) is discussed beginning at paragraph 5.300. The recommendations for DC systems are already given starting at paragraph 7.88. These apply to both plants with active and passive ECCS.
179	WNA/CORDEL	40	7.79 line 2	"…after a specified time in order to preserve resources…"	Delete "in order"...it is not necessary to understand the meaning and causes the sentence to be repetitive.	x			
180	WNA/CORDEL	41	7.89	"…sizing is normally station blackout. …"	Insert period at the end of the sentence.	x			
181	WNA/CORDEL	42	I-12 line 4	"…variations in the grid supply. The grid is…"	Delete redundant period after "supply."	x			
182	WNA/CORDEL	43	I-8 line 1	"…fundamental bases for reliability…"	Change "base" to "bases" for proper grammar.			x	OK as is.
183	WNA/CORDEL	44	II-13. 3rd bullet	"…element or system faults..This protective	Delete redundant period after "faults."	x			

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184	WNA/CORDEL	45	II-13. 2nd and 3rd bullets	The voltage drop/load flow studies done … The voltage drop/load flow studies done …	Indent text here and add a unique identifying bullet since these points outline a general philosophy under the bullet above			x	Comment is unclear.
185	WNA/CORDEL	46	II-15. p.82/line 1	"…These may be include loss…"	Delete "be", it is grammatically incorrect here.	x			
186	WNA/CORDEL	47	II-15. p.83/line 2	"…and other controls.. The degree…"	Delete unnecessary period after "controls."	x			
187	WNA/CORDEL	48	p.83/II-20 line 2	"…network of lightning rods, metal conductors, and ground electrodes	Insert a comma after rods. It's needed for clarity.	x			
188	WNA/CORDEL	49	p.84/II-21 line 3	"…should be finally tied to the one grounding grid."	Delete "the" as indicated. ...it's not necessary and is grammatically incorrect.	x			
189	WNA/CORDEL	50	p.84/II-25 line 5	"…with frequency spectrum. "	Add a period at the end of the sentence.	x			
190	WNA/CORDEL	51	Page 87 (last page)	Title: Contributors to Drafting and Review (The second line from the bottom) Yonezawa, T. Mitsubishi Heavy Industries, Japan. Please change the company name belong to Yonezawa, T. from "Mitsubishi Heavy Industries, Japan" to "Energis, Japan".	Mr. Yonezawa had retired from MHI and moved to Energis which is a subsidiary company of MHI.	x			