NUSSC Comments resolution on DS514 (draft J), Step 11

Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
BR 1	1.10	The qualification process for passive equipment (e.g. pressure relief valves and Passive Autocatalytic Recombiners) and mechanical components (e.g. piping and vessels), for which the safety performance is assured by design in accordance with applicable codes, is outside the scope of this Safety Guide.	This Safety Guide doesn't make it clear if only mechanical components that have structural function are out of scope or if passive equipment that are important to safety during an accident or severe accident are also out of scope.	x	Paras 1.9 and 1.10 defines the scope of equipment covered in this safety guide. Pressure relief valve is an active component (it has moving parts) and is subject to qualification. Passive autocatalytic recombiner is a special equipment requiring functioning in harsh environment. If it requires qualification, then it should be qualified. This safety guide does not specify each individual equipment subject to qualification, rather it provides commodity groups that are in or out of scope is in the scope.		
BR 2	2.28	(c) Equipment specifications (see para. 2.29);	Para 2.29 refers to equipment specifications	x			
BR 3	General	The guide is based on IAEA´s GSR which already addresses the commitment to a "quality management system". In Brazil, we are still committed to comply with a "quality assurance system". So, some requirements would be more complicated to be followed by us if we need to comply with a "quality management system". Therefore, considering that this guide should be followed by each and every member with different "quality system" levels, it would help to		x	This safety guide references the IAEA safety standards. As such, we have to refer to GSR Part 2 leadership and management for safety and its supporting safety guides. But this does not prevent Member States to apply their own quality system.		

		inform the users that they should perform a “review” of the guide prior to implementing it.					
BR 4	1.14	It is stated that the verification and validation of software is out of scope of this guide. Nevertheless, we understand that these should be addressed in the guide, even if already detailed in SSG-37 and SSG-39 standards.				x	This safety guide references SSG-37 and 39 for SW qualification. This is the IAEA agreed practice to avoid repetitions or different interpretation on the same subject among different safety guides. Moreover, recommendations on SW qualification have been integrated in different sections in SSG-39; it would be rather difficult to include these clauses in this safety guide too.
BR 5	2.24	It is mentioned that the equipment qualification programme should be subject to a quality assurance programme, at first, specific for this subject. We understand that all relevant elements for an equipment qualification programme, as the text mentions, such as: design, purchasing, fabrication, storage, installation, maintenance and commissioning, are encompassed in each Plant´s Quality Assurance Program as a whole.		x	It is correct understanding. Quality assurance programme encompass all mentioned elements.		
BR 6	7.1	The guide mentions that interfaces should be clear defined between the equipment qualification programme and other programs, including the “quality management programme” (item (j)). Therefore, perhaps each existing “programme” could incorporate the specific questions concerning all aspects of an equipment qualification.		x	Quality management included in the list.		
BR 7	2.14	Qualified life is the period for which	To be in accordance with other part			x	Para 2.14 is a definition of

		a structure, system or component has been demonstrated, through testing, analysis, experience or combination of these methods,	of document				qualified life which is taken from the IAEA Safety Glossary. We cannot change an agreed term in the glossary.
BR 8	2.29	Certificates and test documentation with respect to industry standards and quality assurance.	The certification of the quality assurance process is important too	x			
BR 9	5.6.	… during maintenance activities specifically undertaken for equipment qualification purposes or that cannot be reused again in normal maintenance (e.g. seals)	The replacement of some items that affect qualification should be done even if the qualified life did not expire but because the item cannot be reused	x			
DE 1	2.6	Equipment qualification should consider possible synergistic effects (e.g. simultaneous elevated temperature, humidity and radiation level and dose rates), where such effects could lead to significant ageing effects and degradation mechanisms or adverse equipment performance under accident conditions.	Clarification	x			
DE 2	3.11	Relevant environmental conditions for operational states typically include the following: – Ambient temperature and pressure; – Humidity and steam; – Radiation level; – Submergence; – Chemical leakages (e.g. boric acid or steam spray); – Chemicals in the atmosphere (salt mist, oil aerosols and dust); – Induced vibrations from neighboring equipment or due to a seismic event; – Electromagnetic fields; Seasonal and climatic variations should be taken into account when preparing the test plan.	Other applicable chemical sprays are additional environmental conditions should also be included here.	x			

ENIS 1	2.5	This includes an evaluation of the suitability of systems or components for performing the safety functions under the effects caused by specified service conditions during normal plant states and during events not excluded by included in the design of a nuclear installation (e.g. thermodynamic events, seismic, electromagnetic phenomena, arcing, lightning). In contrast, internal fires, explosions, internal flooding, tornadoes or hurricanes are not normally considered in the equipment qualification because the design generally protects the equipment from the effects of these events.	This depends on specific design demands which are specific to the site. ENISS proposes to delete this second sentence.			x	We prefer to keep the second sentence; it provides clarification why internal fires, explosions, internal flooding, tornadoes or hurricanes are not normally considered in the equipment qualification. This was a comment from a Member State consultation.
ENIS 10	3.19	Modify the para as following: "Electromagnetic fields can vary in time and in space. Therefore, periodic In case of changes in surrounding areas (e.g. introduction of new equipment), measurements of electromagnetic fields should be performed to identify and quantify sources of electromagnetic interference, in order to ensure that the status of qualified equipment will be preserved."	Electromagnetic fields vary when there is change in surrounding areas (e.g. introduction of new equipment which may be source of interferences); special attention shall be paid at this occasion (cf. IEC/IEEE 60780-323 7.2.6.4)	x	New 3.20. Electromagnetic fields within a specified location within a nuclear installation may change with time due to the operation of equipment or replacement of equipment in the area (zone).Therefore, when changes to electrical inputs or electrical equipment occur within an area (zone), additional site survey measurements of electromagnetic fields should be performed to identify and quantify sources of electromagnetic interference, in order to ensure that the status of qualified equipment will be preserved.		
ENIS 11	3.12	Only retain "seismic vibration"	In 3.12, there is a list of relevant operating conditions to be considered without referring to any	x	Paras 3.11 and 3.12 have been modified along with comments from Japan.		

		Or "seismic vibration (e.g. SL-1, as specified in NS-G-1.6 [16])", only if appropriate because this level seems to be link with tests on shaking table. Does-it apply for seismic qualification by analysis?	value or level Besides there is no-definition of "SL1 seismic vibration". (→ level SL2 defined in 4.35 with mention to NS-G-1.6 but it's on the test section)		NS-G-1.6 is going to be superseded by DS490 which already contains SL-1 and SL-2.		
ENIS 12	3.12	Include: Ratio between operating time and standby (e.g. for pumps, diesels,…)	This ratio is similar to the operating cycles, but the4n expressed in a time ratio: e.g. for diesels that operate only in case of emergency and during test. Otherwise they are in standby. Service conditions shall be different when the diesel is in operation (temperature, vibration) and thus the ratio shall be required to determine the lifetime of the equipment installed on the diesel.			x	This proposal is not clear, or perhaps too detailed for the safety guide. Nevertheless, para says that "Relevant operating conditions for operational states typically include the following", which is not exhaustive.
ENIS 13	3.26	Add « earthquake »" into the list of the service conditions resulting from design extension conditions	« Earthquake » should be considered in the service conditions resulting from design extension conditions (cf. Fukushima event) in the same way as for « design basis accident »			x	Well, there is not list of service conditions resulting from DEC. Para 3.26 (now para 3.27) reads: Service conditions resulting from design extension conditions with core melting should be specified through a consideration of appropriate accident profiles that describe the harsh ambient conditions (e.g. pressure, temperature, humidity, radiation dose and dose rates at various stages of the severe accident, exposure to toxic gases, flooding levels), under which the equipment needs to perform its safety functions. Moreover, the earthquake is an initiating event that may lead to

							DEC. We do not consider the seismic event as the environmental conditions resulting from DEC.
ENIS 14	3.30	(c) Definition of the equipment performance requirements and the applicable service conditions as described in points 3.1 to 3.29 A description of the specified environmental conditions and operating conditions expected during operational states and accident conditions, including for seismic events; (d) The safety class (see SSG-30 [9]) assigned to the equipment and the corresponding supplemental classifications (e.g. seismic classification, quality classification); (e) A description of the acceptance criteria for equipment qualification.; (f) Qualified life objective, (g) Useful information from design and construction code.	- It is unclear why there is no reference to the previous points describing the equipment performance criteria and service conditions in detail. Mention should be made to them. - Include the qualified life objective as a design input for qualification. Include useful information from design and construction code and version (ASME, RCC-E, RCC-M, KTA, …).	x	I agree; it is inconsistent with the beginning of section 3. Para 3.30 moved to the beginning of Section 3 and modified to fit section subheadings. Para 3.31 is not needed and therefore deleted; environmental parameters are already described. I would prefer not to include qualified life objective because it is not convenient for some MS.		
ENIS 15	3.30	c)To complete the sentence "A description … including seismic event and airplane crash "	To be consistent with 3.24.	x	Para 3.30 is deleted.		
ENIS 16	3.33	… Design requirements, service conditions and performance requirements derived from the safety design of the nuclear installation;	It is unclear why the bullet on service conditions has been deleted -> if radiation is present, the preliminary suitability assessment should select an equipment that is not or less sensitive to radiation (e.g. avoid software or avoid certain	x			

			specific materials sensitive to radiation like Teflon). It is that important that a specific bullet 3.34 is present on the service conditions, hence it must also appear in the list of point 3.33				
ENIS 17	4.21	To avoid misinterpretation, please add an example to clearly explain what the para is intended to state. "While the complete equipment qualification process should cover all of the intended safety functions, a single functional test may be used to test just one aspect of the ability to perform these functions."	The para is difficult to understand	x	For example, a containment penetration has two safety functions; electrical functions and containment pressure boundary functions. These functions may be tested separately. LOCA test of 6kV penetration when energized could be a challenge.		
ENIS 18	4.26	Add at the end of the para "Alternative methods can be used" in the same way as it written in Draft H.	Accelerated thermal ageing testing according to IEC 60068-2-2 "Environmental testing – Part 2-2: Tests – Test B:Dry heat" is also an acceptable method which has been being used for many equipment qualifications.			x	Well, the 'alternative methods' were deleted based on several MS comments. Anyway, para 4.26 is informative only.
ENIS 19	4.27	Add at the beginning of the para: "Whichever method is used, the parameters used during the accelerated ageing process should be documented and justified."	The requirement is applicable to whichever method used.			x	If there is no 'alternative method' then this modification is not needed.
ENIS 2	2.15	The qualified life should be established for equipment that is subject to significant performance degradation mechanisms that can occur under the range of specified service conditions for operational states its safety functions	"Safety functions" is more suitable			x	Para 2.14 is a definition of qualified life which is taken from the IAEA Safety Glossary. We cannot change an agreed term in the glossary.
ENIS 20	4.29	The total dose that might be received should be simulated for operational states and accident conditions. The applied dose rate should be low enough to ensure that the accelerated radiation ageing remains realistic.	Dose gradient must be avoided.	x			

		The dose rate should be equally distributed on the equipment.					
ENIS 21	4.36	Add a para to address the need of checking that the equipment, if required, continues to operate during earthquake according to the test specifications	It's part of the objectives of seismic testing	x	Para 4.36 modified		
ENIS 22	4.37	To reverse the order of the two paras.	The order seems to be more logical that way	x			
ENIS 23	4.46	Qualification by analysis may be used to extrapolate existing equipment qualification results to address changes in equipment, material composition, performance requirements, services conditions, installations, and also for reassessing the qualified life of equipment.	Possible change on environmental conditions	x			
ENIS 24	4.48	An exception should be made for equipment with large physical size such as pumps or diesel generating sets. This para shall be modified as following: "it is not recommended for analyzing equipment functionality. However, exception may be made for equipment that cannot be submit-ted to testing due to its physical size or the limitations of the test means".	Functionality of pumps is largely demonstrated by analysis as it's difficult to test them under seismic conditions on a shaking table as an example.	x			
ENIS 25	4.50	Operating experience for an equipment on performance data under known service conditions may be used as supplemental information to help demonstrate the reliability of the qualification of the same type of equipment or similar type but of the same equipment family to equal or less severe service conditions. perform safety functions. Qualification by operating experience alone is not sufficient for safety	It is in fact the performance data under known service conditions of an equipment that can be considered for operating experience. The second sentence cannot be an acceptable general principle. It should be deleted. In practice and in any case the qualification is required to be justified. If the part based on			x	Not accepted. This would downgrade this safety guide. For **safety systems** (performing Cat A functions per 61226 or SSG-30), qualification only by experience is an unacceptable method. This is taken from SSG-39.

		systems and should, therefore, be combined with additional qualification testing of the equipment.	operating experience is not sufficient, it will then be supplemented by other qualification methods.				
ENIS 26	4.51	Delete the reference to "a third-party", modify the para as following: "The validity of any operating experience feedback provided by the manufacturer should be confirmed by a third party, i.e. another operating organization with relevant experience of the use of the equipment. It should also be ensured that adequate documentation of the service conditions is available".	Any nuclear engineering service which has all the skills in qualification field and relevant experience of the use of the equipment can assess the validity of operating experience and provide the evidence to bring to the regulatory.	x	4.51. The validity of any operating experience feedback provided by the manufacturer should be confirmed by a third party, i.e. another organization with relevant experience of the use of the equipment. It should also be ensured that adequate documentation of the service conditions that relate to the operating experience is available		
ENIS 27	4.56	"ASSESSMENT OF EQUIPMENT CAPABILITY FOR SEVERE ACCIDENTS"	Confusion with 4.1 (d) which addresses « design extensions conditions », 3.26 « conditions with core melting » and 4.56 "severe accidents". Please harmonize and use the most appropriate term.	x	Modified to : ASSESSMENT OF EQUIPMENT CAPABILITY FOR DEC WITH CORE MELTING		
ENIS 28	5.3	Add "manufactured" in the list as following: "To meet the above requirements, qualified equipment should be designed, manufactured, procured, stored, installed, commissioned, inspected, operated, maintained and replaced or modified…".	Preservation of equipment qualification is also necessary during manufacturing: any change in the manufacturing process may impact the qualified status of the equipment	x			
ENIS 29	5.3	To meet the above requirements, qualified equipment should be designed, procured, stored, installed, commissioned, inspected, operated, maintained and replaced or modified in a manner that helps to ensure that the equipment qualification is preserved throughout its qualified lifetime. for the lifetime of the	The lifetime of the installation may be higher than the qualified lifetime of certain equipment.			x	This is the same as for comment ENISS 3, para 2.19. We understand equipment qualification as <u>a process</u> that should be preserved for the lifetime of the installation.

		installation.					
ENIS 3	2.19	The preservation of equipment qualification is needed throughout its service life the lifetime of the nuclear installation.	Equipment service life and nuclear installation lifetime may differ, depending how the latter is defined. Example: ventilation system and filters still critical during dismantling			x	Service life applies to SSC. See IAEA glossary: The period from initial operation to final withdrawal from service of a structure, system or component. However, this para says that the equipment qualification should be an activity performed during the lifetime of the installation.
ENIS 30	5.7	Remove the items g), h), i)	These reasons do not impact the established equipment qualification itself; they will lead to look for a new equipment to qualify to replace the equipment that is affected by obsolescence			x	These are relevant factors that may adversely impact equipment qualification. We should keep them all.
ENIS 31	6.4	(c) Periodic regulatory inspections to ensure that qualification activities are being performed in accordance with Member States regulatory framework for initial licensing and long term operation, (d) Audits of vendor/manufacturer quality assurance program and processes relevant to equipment qualification.	This information was added to point 6.1. It is the most important audit to perform and thus should be repeated in 6.4 where the types of audits are specified.	x			
ENIS 32	Annex A	- IEC61000-6-2 (2016): Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments IEC61000-6-4 (2018): Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments	Standards are missing from the list			x	Annex A is informative; we have listed standards that have particular relation with qualification and testing.
ENIS 4	2.21	f) Specify “Changes in storage conditions (e.g. time, ambient temperature, packaging) to the manufacturer’s instructions	There is any impact as long as the storage conditions remain in accordance with the manufacturer’s instructions.	x	Paras 2.19-2.22 which deal with “Preservation of equipment qualification” deleted from section 2.		
ENIS 5	2.28	Separate the input (a, b, c) from the	For a better presentation and			x	We refer to ‘qualification

		output documentation (d, e, f) of the qualification process	understanding				documentation' regardless in which phase it is developed.
ENIS 6	2.28	If the para is addressing the plant level, specify as following: "Equipment qualification documentation of the plant should include the following:" Equipment specifications (see para. 2.29 8);	To make difference between EQ documentation at the plant level and EQ documentation of one specific equipment	x	This safety guide applies to nuclear installation.		
ENIS 7	2.28	Certificates of conformity that support the equipment qualification,	This added bullet includes the certificates of conformity to be supplied by the manufacturer or test facility. These documents confirm the qualification.	x	It is covered in para 2.29. item (h) Certificates and test documentation with respect to industry standards, right?		
ENIS 8	2.28	A justification demonstrating the representativity for a certain family, model or type of equipment/components when the qualification program covers different components/equipment.	Difference should be made between those equipment/component that actually have been subjected to a qualification program and those that are considered as qualified by means of the representativity of the tested sample.	x	Paras 2.32 and 2.33 describes objective of qualification summary report. This information also contains suitability of a certain family, model or type of equipment/components. A representativity for a certain family, model or type of equipment/components is provided in para 4.47.		
ENIS 9	2.31	Suggestion to simplify the para as following: "The documentation of the equipment qualification" The plant qualified equipment list should identify individual components that have a qualified life that is shorter than the expected in-service life of the equipment assembly, to allow for their replacement at predetermined intervals consistent with their qualified life	Simplification			x	We prefer using a general term "The documentation of the equipment qualification" because not everyone may have a qualified equipment list (it was a comment to previous revision).

FI 1	General	The use of the term "performance requirements" should be clarified and as necessary the term defined. IDENTIFICATION OF EQUIPMENT PERFORMANCE REQUIREMENTS para. 3.1 request specification of functional performance requirements. Obviously, paragraphs 3.2 to 3.4 discuss functional performance requirements though only term performance requirements is used. This applies also to 3.14. Para. 3.32 discusses functional and performance requirements. The term "performance requirements" is used 18 times in the document.		x	Added to para 3.1. explanation from SSG-39, 6.93 that provides examples of performance requirements: Examples of performance requirements include requirements on accuracy, resolution, range, sample rate and response time. Deleted 'functional'.		
FI 2	2.14	Qualified life is the period for which a structure, system or component has been demonstrated, through testing, analysis or experience, to be capable of functioning within acceptance criteria during specific operating conditions while retaining the ability to perform its safety functions in accident conditions for a design basis accident or a design basis earthquake [15]. The term qualified life is not used in all of the Member States. The qualification for the lifetime of the equipment serves the same purpose of demonstrating the capability of performing the required safety functions in accident conditions in some Member States.	IAEA has informed in the MS comments resolution table that it is well known that this definition is not in line with SSR-2/1. IAEA should clarify the process for updating the terms in the glossary? Please modify the text to a more flexible form and add: The term qualified life is not used in all of the Member States. The qualification for the lifetime of the equipment serves the same purpose of demonstrating the capability of performing the required safety functions in accident conditions in some Member States. See. for instance, WENRA reference level G4.2 for existing reactors states "Qualification procedures shall be adopted to confirm that SSCs important to safety meet throughout their design operational lives the demands for performing their	x	Added a footnote to para 2.14 as suggested: 'The term qualified life is not used in all of the Member States. The qualification for the lifetime of the equipment serves the same purpose of demonstrating the capability of performing the required safety functions in accident conditions in some Member States'. Revised Glossary has been published in 2020 while SSR 2/1 was published in 2016. I made a formal note to our editors to revise the definition of the qualified life in SSR 2/1 (Rev.) during the next revision cycle. The IAEA Safety Glossary		

			function, taking into account environmental conditions46 over the lifetime of the plant and when required in anticipated operational occurrences and accident conditions."		also distinguish between terms 'design life' and 'qualified life' which is not the same. We also use qualified life consistently with IEC/IEEE standard 60780/323, which is recognized international standards widely used in nuclear community.		
FR 1	2.14	Qualified life is the period for which equipment has been demonstrated, through testing, analysis or experience, to be capable of functioning within acceptance criteria during specific operating conditions while retaining the ability to reliably its safety functions in accident conditions or after an earthquake under accident conditions for a design basis accident or a design basis earthquake.	To be consistent with the rest of the document. Indeed, the DS514 addresses all types of accidents and earthquake, considered in the design			x	Para 2.14 is a definition of qualified life which is taken from the IAEA Safety Glossary. We cannot change an agreed term in the glossary.
FR 2	2.32	Test specifications, test reports and analyses reports and test reports should be prepared for each type of qualification (e.g. seismic, environmental, electromagnetic compatibility, functionality testing under specified dynamic loading conditions, ageing and wear through functional cycling).	This paragraph deals with all types of qualification, not only qualification by test	x			
FR 3	3.28	Service conditions resulting from postulated accidents specified for harsh environments	The paragraph deals with equipment located in harsh environment. Postulated accidents can induce in some areas an environment not significantly more severe than the environment that would occur during normal plant operation	x	The thermodynamic profile of the containment <u>should consider potentially harsh environmental conditions that would exist prior to severe accident occurrence</u> and should be estimated through simulation using severe accident codes.		
FR 4	4.49	Test profiles should include margins that apply to calculated design basis	The DS514 addresses all types of accidents, including DECs			x	Sorry I cannot find this para in Draft J. Para 4.43 reads

		accident profiles. Suitable margins for conducting the qualification type tests are provided in Ref. [14].					'Information on suitable margins for conducting type tests on electrical equipment important to safety is provided in IEC/IEEE 60780-323'.
FR 5	5.27	Known ageing mechanisms exist, which cannot could not be fully evaluated or simulated when qualification was established.		x	This is now in para 5.15. "When new ageing mechanisms or increases in the effects of previously known ageing mechanisms are identified, the relevant parts of the equipment qualification programme should be reviewed to determine whether changes in the qualified life or maintenance of the equipment are needed."		
FR 6	3.34	Service conditions resulting from design extension conditions in severe accidents should be identified. These include appropriate accident profiles that describe the harsh ambient conditions (e.g. pressure; temperature; humidity; radiation dose and dose rates at various stages of the severe accident; chemical gas exposure; flooding levels), under which the equipment is required to perform its safety functions. If appropriate, harsh environmental conditions resulting from postulated accident leading to the occurrence of severe accident should also be considered to be applied before the appropriate severe accident condition profile.	For example, for a LOCA leading to a severe accident, harsh environmental conditions resulting from this DBA should also be considered.	x	First sentence in para para 3.28 modified as follows: "The thermodynamic profile of the containment should consider potentially harsh environmental conditions that would exist prior to severe accident occurrence and should be estimated through simulation using severe accident codes."		
FR 7	3.39	New: Any instrumentation required to confirm the final state of the main equipment used for severe accident mitigation (for instance the closed position of the containment isolation valves, the instrumentation needed to	It is important to focus on the qualification of instrumentation used to check that qualified equipment are working as expected.	x	Now para 3.30. The mission time for each item of equipment used for monitoring integrity of fission product barriers or each item of equipment for		

		know if a ventilation/filtration used for severe accident is working) and any instrumentation required to decide on countermeasures shall be included in the design. This instrumentation shall be safety classified, adequately qualified for environmental conditions and it shall have reliability commensurate with the function that it is required to fulfil".			mitigating the consequences of severe accidents and each item of equipment for monitoring their adequate performance should be derived from analyses of the various stages of the severe accident. This equipment needs to remain functional beyond the achievement of a safe state and should have the reliability that commensurate with the function required to fulfil.		
IEC/JP1	General	Para 5. Editorial change "Maintenance relatING to qualified equipment" to Maintenance relating to qualified equipment".	Para 5. Editorial change "Maintenance relatING to qualified equipment" to Maintenance relating to qualified equipment".	x			
IEC/JP10	3.13	Page 10: Recommend rewriting the first sentence of para 3.13. "The test conditions for equipment qualification should bound the service conditions associated with the mounting location of the equipment as a minimum".	The test conditions do not need to bound the service conditions for all equipment of the same type. Please note, "same type" has not been defined and can mean different things to different users. In addition, this is an economical decision that needs to be address when defining the approach and methods used in the qualification program. For example, more than one test specimen can be used address different environmental zones within the power plant.	x			
IEC/JP11	3.19	Page 11: Recommend changing the first sentence to the following: "Electromagnetic fields within a specified location within a nuclear installation may change with time with the operation of equipment or replacement of equipment in the area (zone)."	This document should not generalize the application of the Electromagnetic field or introduce a new phrase (time and space). It should stay focus on how Electromagnetic field applies to a nuclear installation.	x			

IEC/JP12	3.19	Page 11: Recommend the following change to the second sentence: "Therefore, when electrical inputs or electrical equipment changes occur within an area (zone) additional site survey measurements of …."	After the initial site survey for electromagnetic interference (which should address all normal plant operating states), additional electromagnetic field measurements should only be required when power, grounding, or new electrical equipment design changes occur in the specified area (zone).	x			
IEC/JP13	3.27	Page 12: Add the source and title for Ref. [20].	The first time a document is referenced it should be clearly defined.	x			
IEC/JP14	3.31	Pare 13: Recommend changing "operational conditions" to "operating conditions" to be consistent with other paras.	Recommend changing "operational conditions" to "operating conditions" to be consistent with other paras.	x			
IEC/JP15	4.1	/ Footnote Page 14: Recommend changing the definition of "pre-existing item" to the following: "A item that has been qualified in accordance with an industry standard for a similar application under similar or more severe service conditions."	Present definition of "pre-existing item" is open ended and does not have to be available in the market. The new item may be the latest design of the previous item which is not be manufactured.	x			
IEC/JP16	4.1	Page 14: Last sentence needs to be revised because safety related item may be required to perform a safety function during and/or after accident conditions and earthquakes.	Last sentence needs to be revised because safety related item may be required to perform a safety function during and/or after accident conditions and earthquakes.			x	This sentence is correct, we just say that 'for items <u>not important</u> to safety… because all above applies to items important to safety.
IEC/JP17	4.4	Page 15: Recommend the wording "most accurately simulates" to be updated to be consistent with para 4.38 which requires the specimen be in the "worst state of deterioration".	The wording "most accurately simulates" is not consistent with para 4.38 which requires the specimen be in the "worst state of deterioration".	x			
IEC/JP18	4.5	Page 15: Recommend deleting "will be performed" or change "will be performed" to "when performed"	Editorial.	x			
IEC/JP19	4.7	b) Page 15: Recommend changing "internal dimensions" to "dimensions and tolerances".	Internal and external dimensions of the specimen and its relations with other items may affect the functional performance of the specimen.	x			
IEC/JP2	1.2	Page 1: Add the IAEA between following publications.	All the publications in Para 1.2 are IAEA documents and should so be	x			

			defined.				
IEC/JP20	4.9	Page 15: Recommend changing the sentence to "The test specification include the following information:"	Design requirements and performance throughout the document are associated with the equipment to be qualified. The items listed are a combination of both equipment and test requirements.	x			
IEC/JP21	4.33	Page 19: "Simulation of other stressors" is being introduction but previous stressors have not been defined as such. Recommend defining environmental conditions and operating conditions as stressors in para 3 subsections.	"Simulation of other stressors" is being introduction but previous stressors have not been defined as such. Recommend defining environmental conditions and operating conditions as stressors in para 3 subsections.	x	Added to para 3.7.		
IEC/JP22	4.35	Page 19: Recommend rewriting first sentence because non-seismic vibration is defined as a subset of mechanical loads in para 3.12. line 5.	Recommend rewriting first sentence because non-seismic vibration is defined as a subset of mechanical loads in para 3.12. line 5.	x	Deleted non-seismic vibration.		
IEC/JP23	4.43	Page 20: Add the source and title for Ref. [21].	The first time a document is referenced it should be clearly defined.	x			
IEC/JP24	4.51	Page 21: Recommend changing the last sentence to the following: "It should be ensured that adequate documentation of the operating experience service conditions is available."	It is not clear presently clear if document is addressing the service conditions associated with the operating experience or the new plant installation. Both need to be available.	x			
IEC/JP25	4.53	Page 21: Recommend changing "operating experience, and analysis" to "analysis, and operating experience" to be consistent with other paras of the document.	Recommend changing "operating experience, and analysis" to "analysis, and operating experience" to be consistent with other paras of the document.	x			
IEC/JP26	4.57	Page 21: Recommend changing "time necessary" to "mission time necessary" to be consistent with uses of mission time in the document.	Recommend changing "time necessary" to "mission time necessary" to be consistent with uses of mission time in the document.	x			
IEC/JP27	4.58	Page 22: Recommend changing the end of the last sentence from "throughout design extension conditions" to "throughout design extension conditions in a severe	Editing last sentence for clarity to identify the design extension conditions are associated with a severe accident.	x	…design extension conditions with core melting.		

		accident".					
IEC/JP3	1.12	Page 2: Add the source and title for Ref. [17].	The first time a document is referenced it should be clearly defined.			x	Please, se our editor response, we provide full title only to references to IAEA safety standards.
IEC/JP4	2.16	Page 5: Change "see paras 5.28 and 5.29" to "see paras 5.18-5.21".	Wrong paras are being referenced.	x			
IEC/JP5	2.19	Page 6: Paras 2.19-2.22 which deal with "Preservation of equipment qualification" should be move to Para 5 or an introduction should be added to these paras that references back to Para 5. Most of the items are in Para 2.21 are in Para 5.7 but said in a different way.	Information dealing with "Preservation of equipment qualification" does not flow well here. It has already been introduced in Para 2.13.	x	I agree, only introduction remains, and the rest is deleted from Section 2.		
IEC/JP6	3.7	Page 9: Para 3.7 is confusing with the introduction of the new term "process conditions". This term is not needed; service conditions, operating conditions and environmental conditions is sufficient. Recommend stays with the present wording in Para 2.3 of Safety Reports Series No. 3, "Equipment Qualification in Operational Nuclear Power Plants: Upgrading, Preserving and Reviewing", IAEA Vienna, 1998.	Page 9: Para 3.7 is confusing with the introduction of the new term "process conditions". This term is not needed; service conditions, operating conditions and environmental conditions is sufficient. Recommend stays with the present wording in Para 2.3 of Safety Reports Series No. 3, "Equipment Qualification in Operational Nuclear Power Plants: Upgrading, Preserving and Reviewing", IAEA Vienna, 1998.	x			
IEC/JP7	3.11	Page 10: Recommend changing "- Induced vibrations from neighboring equipment or due to a seismic event" to "- Induced vibrations from neighboring equipment" and "– earthquakes". All earthquakes are environmental conditions.	All earthquakes are environmental conditions and therefore should have their own line item.	x	See modifications according JP3 comment.		
IEC/JP8	3.12	Page 10: Recommend under "Mechanical loads" deleting the example "self-induced flow" since it should be addressed under "non-seismic vibration". It not, then consider replacing "non-seismic	"Non-seismic vibration is a catch all term for all vibration sources that are not earthquake related. Presently, para 3.12 references "self-induced vibration" and "induced vibration" (para 3.11). Both of these can be	x	See modifications according JP7 comment.		

		vibration" with items such as pipe vibration, pump and motor vibration.	considered "non-seismic vibration"				
IEC/JP9	3.12	Page 10: Recommend deleting "SL1 seismic vibration".	"SL1 seismic vibration" is a low intensity earthquake and therefore an environmental condition.	x			
India 1	3.7	The entire para may be re-written to bring in clarity for the following definitions: a. Service Condition, b. Operating Condition c. Environmental Conditions.	Service conditions normally include environmental conditions, together with process conditions like loading, power, signal conditions, etc. for all plant states. The first line in the document mentions that service conditions include operating conditions, (which as mentioned in the second line, is defined by process conditions & environmental conditions), and environmental conditions for all plant states. This causes confusion as 'environmental conditions' is used twice, viz. while defining service condition, as well as operating condition. Operating conditions should not be defined by environmental conditions and will depend only on process conditions. This is further clarified in Paras 3.11 & 3.12.	x			
JP1	2.4	Paragraph 5.29 (b) of SSR-2/1 (Rev. 1) [1] states: "…the features that are designed for use in, or that are capable of preventing or mitigating, events considered in the design extension conditions … shall be capable of performing in the environmental conditions pertaining to these ~~the~~ design extension conditions, including design extension conditions in severe accidents, where appropriate".	Typo.	x			
JP10	4.23	The ageing that is expected during operational states may be simulated	Correction of paragraph numbers.	x			

		by accelerated ageing (e.g. thermal, radiation: see paras ~~4.27–4.33~~4.25-4.30) to determine the qualified life of the equipment.					
JP11	4.35	The mechanical load conditions during seismic events and non-seismic events (e.g. hydrodynamic events) that are applied to equipment qualification methods should be developed taking into account an SL-2 earthquake and the associated mechanical loads, as specified in NS-G-1.6 [16], IEEE 344-2013 [26] and ASME QME-1-2017 [27]. This should be considered in the equipment qualification for both harsh environments and mild environments. Add following two documents in the REFERENCES. [26] INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, IEEE Standard for Seismic Qualification of Equipment for Nuclear Power Generating Stations, IEEE 344-2013, IEEE, Piscataway, NJ (2013). [27] THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, Qualification of Active Mechanical Equipment Used in Nuclear Facilities, ASME QME-1-2017, ASME, Two Park Avenue, NY (2017).	Because DS490, which is superseding NS-G-1.6, does not clearly specify the mechanical load combination during seismic event taking into account an SL-2 earthquake, those two documents should be referred to.	x			
JP12	4.36	When appropriate, test specimens should be ~~energized and subjected to electrical and mechanical loading, and~~ restrained and anchored in a manner that accurately represents the installed configuration, and should be energized and subjected to electrical and mechanical loading.	The description should follow the order of development of things.	x			
JP13	4.47	Qualification by analysis may be	Not only flow meters, but also	x			

		used to extend the results of equipment qualification testing to represent an entire family of equipment of the same or similar type, if it can be shown that the tested equipment is representative of other equipment in the same family (e.g. cables, series of motors of the same type, different type/sizes of ~~flow meters~~ process instrumentation).	thermometers and pressure gauges are quite important families of equipment. Process instrumentation is the general expression of those.				
JP14	REFERENCE	[25] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety in the Utilization and Modification of Research Reactors, IAEA Safety Standards Series No. SSG-24, IAEA, Vienna (2012). (A revision of this Safety Guide is in preparation.)	Missing a word.	x			
JP2	2.28	(c) Equipment specifications (see paras. ~~2.28~~2.29 and 3.30);	Correction of the paragraph numbers to be referred.	x			
JP3	3.11	7th bullet Add SL-1 seismic Vibration in para 3.11. as footnote. - Induced vibrations from neighbouring equipment ~~or due to a seismic event~~; - SL-1 vibration # Footnote #: In general, two levels of seismic vibratory ground motion hazard, SL-1 and SL-2, should be defined as the design basis earthquake for each nuclear installation. This is to ensure the safety of the nuclear installation in the event of a rare earthquake (i.e. SL-2), and to ensure the possibility of continued operation in the event of a less severe, but more probable, earthquake (i.e. SL-1). In some States, SL-2 corresponds to an earthquake level often denoted as the safe shutdown earthquake. In	Separate induced vibration and seismic vibration because these two have quite different nature. Add footnote for SL-1 because there is no definition given in this guide.	x			

		some States, SL-1 corresponds to an earthquake level often denoted as the operating basis earthquake					
JP4	3.12	Relevant operating conditions for operational states typically include the following: - Power and power surges; - Operating cycles (e.g. electrical and mechanical, water hammer); - Electrical loading parameters (e.g. voltage, frequency, current); - Mechanical loads (e.g. self-induced flow, ~~self-induced vibration, non-seismic vibrations,~~ thrust ~~or~~ torque, displacement, or non-seismic vibration including flow-induced vibration, condensing mode vibration and quenching vibration); - ~~SL-1 seismic vibration;~~	Better, logical expression. Add essential examples of non-seismic vibration in BWRs. Move SL-1 seismic vibration to para. 3.11 because it is an environmental condition.	x			
JP5	3.19	Electromagnetic fields can vary in time and in space. Therefore, ~~periodic~~ timely measurements of electromagnetic fields should be performed to identify and quantify sources of electromagnetic interference, in order to ensure that the status of qualified equipment will be preserved.	Better wording.	x	Modified along with IEC/JP11 comment.		
JP6	3.20	When seismic testing is used to qualify equipment located in mild environments, pre-ageing (see para.4.23) prior to the seismic tests is necessary only where significant ageing mechanisms exists.	User-friendliness.	x			
JP7	3.22	These conditions are characterized by changes or increases of temperature, pressure, humidity, radiation, submergence, vibration or by changes in process fluid conditions or chemical composition.	For instance, safety relief valve actuators are impacted by non-seismic vibration induced by steam discharge into BWR suppression pool under transient condition and accident condition.	x			
JP8	3.24	Service conditions resulting from postulated initiating events such as SL-2 earthquake or airplane crash	It is better to distinguish SL-1 and SL-2 considering postulated initiating events. SL-1 cannot be a	x			

		should be considered in the equipment qualification programme.	postulated initiating event.				
JP9	4.15	Scale models and grouping method may be used to simulate the actual configuration of the equipment. Scale models should be representative of the configuration and material properties of the equipment to be qualified. The use of scale models should be justified; in particular, it should be demonstrated that the use of scale models will not adversely impact the results of the equipment qualification tests. When grouping method is applied, grouping analysis should be additionally performed to demonstrate the selected item is representative of the group.	The grouping method, which is a different concept from the scale models, is widely used in some Member States. It is better to address this here.	x			
ONR 1	1.7	*The recommendations in this Safety Guide apply to new nuclear installations, and as far as is reasonably practicable to existing facilities.* Various suggestions were made in the UK's MS comments (#12, #29) where points made in the IAEA's 1998 report could be added into the safety guide.	**Note, this comment is a reiteration of the UK's comment #1 made on DS514 Rev H and is made following the stated reason for rejection provided by IAEA.** The UK previously observed that the IAEA's 1998 Safety Report on equipment qualification included "upgrading" amongst the phases on equipment qualification. The comment was rejected, with a statement that this guide is primarily intended for new nuclear installations (and only as far as is practicable for existing facilities). However, Para 1.7 of Draft J states "The recommendations in this Safety Guide apply to new and existing nuclear installations" without the caveat applied in the response to the UK's comment. We therefore have unanswered questions on the scope of this guide:	x	Para 1.7 modified as suggested: The recommendations in this Safety Guide apply to new nuclear installations, and as far as is reasonably practicable to existing installations. It is the IAEA practice that any new safety guide applies primarily to the new nuclear installations because we were worried that an 'upgrading' between qualification steps could become a recommended practice. Therefore, we have excluded 'upgrading' from the text intentionally. But it does not mean it cannot be used. SRS No.4 is rather old, although still contains		

			• Does this guide apply to existing facilities (as per para 1.7) or only as far as is practicable as per the response to our earlier comment? • Does this Safety Guide supersede the IAEA's 1998 Safety Report – if so, where is upgrading considered? Is there a danger of the need to consider equipment qualification during upgrading being lost?		useful information. But safety report is not a consensus publication (not endorsed by review committees). Safety guides do not supersede lower level IAEA publications. There was an attempt to revise SRS No. 4 in Nuclear Energy, but this report was never published (I do not know why).		
ONR 2	5.38	and the Annex Potential additional reference in the Annex to EPRI guidance.	It is welcomed that the latest draft includes para 5.38 'Equipment may also be procured through a vendor or manufacturer who uses a commercial grade dedication process. Whatever the arrangements, the equipment should be qualified in accordance with the equipment qualification programme.' However it is our experience that this is an area that is not always fully understood and additional guidance should be provided. We observe that section 8.5 of EPRI's Nuclear Power Plant Equipment Qualification Reference Manual (2010.1021067) provides useful material and is readily available. The undesirability of referencing a non-IAEA guide in the main text is recognised but is it something that could be referred to in the Annex?	x	I agree. This is good idea to reference EPRI report.		
RF1	2.14	Qualified life is the period for which a structure, system or component has been demonstrated, through testing, analysis or experience, to be capable of functioning within acceptance criteria during specific operating	Clarification is needed, despite of the fact that this definition is taken primarily from Glossary 2018, because accident condition isn't only limited by DBA, but also DEC. Structure, system or component,			x	Para 2.14 provides a definition of qualified life which is taken from the IAEA Safety Glossary. Qualified life is established by using exact parameters and qualification

		conditions while retaining the ability to perform its safety functions in accident conditions, including DEC and external events for a design basis accident or a design basis earthquake [15].	according to DS514, should qualified for DEC also (according to Glossary [15]: "accident conditions. Deviations from normal operation that are less frequent and more severe than anticipated operational occurrences. - Accident conditions comprise design basis accidents and design extension conditions")				methods. If an equipment has been qualified for DBA, it is very likely that this equipment will retain its safety functions(s) in DEC without significant fuel degradation. However, if the event propagates to a severe accident (DEC with core melting), it is very difficult, if even possible, to establish a qualified life, at least with current testing methods, for DEC with core melting. Although we may model the 'TH parameters' associated with a severe accident, but the equipment 'mission time' is basically unknown. We have explained the concept of assessment of equipment reliable performance under DEC with core melting in paras 3.27 to 3.30.
RF2	2.28	2.28. Equipment qualification documentation should include the following: … (c) Equipment specifications (see para. 2.28 2.29);	literal error	x			
RF3	7.2	… With regard to equipment qualification, the safety analysis report should include the following: … (h) information on approaches to qualification of a particular type of equipment (elements), data on the qualification program and documents in which qualification results are given, conclusions about	It is proposed to include an additional hyphen, as when reviewing the SAR by the regulatory body, the main question is not what parameters will be and for which elements (this is, as a rule, in other SAR chapters), but whether the corresponding qualification was carried out, confirming the functioning of the elements in all	x			

		qualifications	states of the station during the project service life; is correct and sufficient qualification methods were used for this (There is a similar paragraph in the previous edition "Principles of qualification of items important to safety", but it was deleted in new revision)				
SA 1	TOC	"Maintenance relatING" should be "Maintenance relating"	Editorial	x			
SA 2	3.12	Power Surges is repeated	Repetition	x			
SA 3	5.13	Current sentence: ""…plant states during a postulated initiating event and plant states following a postulated initiating event." Recommended: "…plant states during and following a postulated initiating event."	Editorial			x	Para 5.13 is a citation from SSR 2/1 (Rev.1). We cannot change wording in SSR 2/1.
SA 4	5.18	The sentence: "This analysis should take in account the stressors should be…" "This analysis should take into account the stressors…"	Editorial	x			
SA 5	7.2	The current IAEA Safety Standards Series No of the Safety Guide for "Format and Content of the Safety Analysis Report for Nuclear Power Plants" is No. GS-G-4.1 not SSG-61. Reference [22] should be updated accordingly in Page 36, as SSG-61 is not approved yet.				x	GS-G-4.1 has been superseded by SSG-61 that is going to be published soon.
USA 1	2.11	The qualified configuration of the equipment should include the equipment itself and the equipment it interfaces with the qualified configuration should include the final versions of software, firmware, hardware description language, and	Editorial	x			

		process, electrical and mechanical interfaces, **mounting**, and equipment orientation					