Qualification of Items Important to Safety in Nuclear Installations (DS514)
(NUSSC Comment resolution to a DPP)
20 June 2018

No	COMMENTS BY REVIEWER				RESOLUTION			
	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Reject.	Reason for modification/rejection
1.	USA 1	General	Add content to the DPP that refers to or describes aspects of generic criteria for equipment qualification The DPP stated: "The IAEA does not have a Safety Guide that provides recommendations on equipment qualification to meet Requirement 30 of SSR-2/1 (Rev. 1), Requirement 13 of SSR-2/2 (Rev. 1), Requirement 29 of SSR-3 and Requirement 30 of SSR-4. "	This addition would provide completeness to address generic criteria for equipment qualification based on safety of Long-Term Operations reviews and OSART and SALTO reports.	x	Enhanced the description of generic criteria that will be addressed in the document.		
2.	USA 2	General	Add content to the DPP that provides clarifying text addressing the issue of "Equipment Qualification" and "Equipment Performance."	The difference for verification purposes between "Equipment Qualification" and "Equipment Performance," is unclear. Equipment may be qualified to function under the required conditions; however, its performance may be graded based on ranking of its performance and the Data Quality Objectives invoked.	x	Criteria related to "Equipment Qualification" and "Equipment Performance" will be addressed in the safety guide (see Section 3 of an updated ToC in a DPP).		
3.	USA 3	General	Add content or a reference to the DPP to include criteria for the frequency of maintenance and testing of equipment and record keeping.	The document did not address the issues of frequency of maintenance and testing of equipment and record keeping Adding this will improve completeness of the document.	x	Record keeping, maintenance and testing of equipment is in the scope of the safety guide; see revise ToC in a DPP.		
4.	USA 4	Section 2 Para 1	Currently reads:	Revised to clarify terminology and to differentiate between	x	However, we prefer keeping 'item' than SSC consistently		

			"The equipment qualification of items important to safety in nuclear installations is a vital part of the installation design basis. Equipment qualification is an important design attribute to minimize common cause failures of equipment due to the effect of seismic, electromagnetic interference and harsh environmental conditions resulting from accident conditions. An incomplete design basis that results in equipment not being qualified for the intended function cannot be solved by redundancy or diversity." Revise to read: "The equipment qualification of structures, systems, and components (SSCs) important to safety in nuclear installations is a vital part of the installation design basis. This new Safety Guide will primarily address the process for establishing and maintaining equipment qualification programmes in nuclear power plants related to functional capability, seismic conditions, environmental conditions, and electromagnetic interference effects over the full range from normal operating conditions up to and including design-basis conditions to provide reliable confirmation that items important to safety are capable of the required performing their safety functions for operational states and accident conditions. The new Safety Guide will also provide guidance for the demonstration of the capability of equipment relied upon to perform their intended safety functions in the event of a severe accident design extension conditions at the nuclear power plant.	the qualifications requirements for SSCs for Design Basis Events (DBE) and for design extension conditions (DEC).		with terminology used in the IAEA Glossary, SSR 2/1, SSR 2/1. SSR 3 and SSR 4. Moved to Section 5 Scope: "This new Safety Guide will primarily address the process for establishing and maintaining equipment qualification programmes in nuclear power plants related to functional capability, seismic conditions, environmental conditions, and electromagnetic interference effects over the full range from normal operating conditions up to and including design-basis conditions to provide reliable confirmation that items important to safety are capable of the required performing their safety functions for operational states and accident conditions. The new Safety Guide will also provide guidance for the demonstration of the capability of equipment relied upon to perform their intended safety functions in the event of a severe accident design extension conditions at the nuclear power plant". This sentence better fits to Section 5 Scope. Excluded: 'Equipment qualification provisions in this safety guide will be implemented for the SSCs important to safety at nuclear installations in accordance with the regulatory provisions of the applicable regulatory authority'. It is a regulatory competence.		

			Equipment qualification provisions in this safety guide should be implemented for the SSCs important to safety at nuclear installations in accordance with the regulatory provisions of the applicable regulatory authority. Equipment qualification is an important design attribute to minimize common cause the risk of equipment failures of equipment due to the effect of issues related to functional, seismic, and environmental capability, and potential electromagnetic interference and harsh environmental over the full range from normal operating conditions resulting from accidental to and including design-basis conditions. An incomplete design basis that results in equipment not being qualified for the intended function cannot be solved by redundancy or diversity."					
5.	USA 5	Section 2 Para 2	Currently reads: "Equipment qualification includes qualification of structures, systems and components to seismic, environmental and electromagnetic interference effects. The qualified life for a particular equipment type is established by type testing in accordance with methods provided in industrial standards (e.g. IEC/IEEE 60780/323). The qualified life considers the in-service ageing of equipment as a result of environmental stressors present in equipment locations during normal operating conditions of the installation (temperature, humidity, radiation)." Revise to read: "Equipment qualification includes qualification of structures, systems and components for functional capability,	Revised to clarify technical terms and makes distinctions between qualification for DBE and a demonstration of capabilities for DEC with core melting.	x	Instead of SSC we keep 'items important to safety'. See above comment resolution.		

			seismic conditions, environmental conditions, and electromagnetic interference effects over the full range from normal operating conditions up to and including design-basis conditions. The qualified life for a particular equipment type component is established by type testing or a combination of testing and analysis in accordance with methods provided in industrial accepted consensus standards (e.g., IEC/IEEE 60780/323). The qualified life considers the in-service ageing of equipment as a result of environmental stressors present in equipment locations during normal operating conditions of the installation (such as temperature, humidity, radiation, and submergence), including the capability to perform their intended its safety functions under design-basis accident conditions near the end of its qualified life. Equipment relied upon to perform safety functions in the event of design extension conditions should also be demonstrated to be capable of performing those functions. However, given the uncertainties of conditions during design extension conditions, the demonstration of this capability can be done using realistic analyses, considering uncertainties and margins as appropriate.”	Modified along with FR#6 comment: Equipment relied upon to perform safety functions in the event of design extension conditions with core melting should also be demonstrated to be capable of performing those functions using implementation of a qualification programme. However, given the potential uncertainties of conditions during design extension conditions with core melting, the demonstration of this			

				capability can be done using realistic analyses, considering uncertainties and margins as appropriate regarding the definition of these conditions.				
6.	USA 6	Section 2, Paragraph 4	Currently reads: "IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), Safety of Nuclear Power Plants: Commissioning and Operation requires the systematic assessment of equipment qualification to provide reliable confirmation that items important to safety are capable of the required performance for operational states and for accident conditions." Revise to read: "IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), Safety of Nuclear Power Plants: Commissioning and Operation requires the systematic assessment of equipment qualification to provide reliable confirmation that SSCs important to safety are capable of performing their intended function for operational states and for accident conditions."	Revised to clarify the term "performing their intended function".			x	Instead of SSC we keep 'items important to safety' consistently with SSR 2/1, 2/2, SSR 3 and SSR 4. See above comment resolution.
7.	USA 7	Section 2, Paragraph 5	Currently reads: "IAEA Safety Standards Series No. SSR-3, Safety of Research Reactors, and IAEA Safety Standards Series No. SSR-4, Safety of Nuclear Fuel Cycle Facilities require a qualification programme to be implemented for a research reactor facility to verify that items important to safety are capable of performing their intended functions when necessary, and in the prevailing environmental conditions, throughout their design life, with due	Revised to provide consistency with the preceding paragraphs.			x	Instead of SSC we keep 'items important to safety' consistently with SSR 2/1, 2/2, SSR 3 and SSR 4. See above comment resolution.

			account taken of reactor conditions during maintenance and testing." Revise to read: "IAEA Safety Standards Series No. SSR-3, Safety of Research Reactors, and IAEA Safety Standards Series No. SSR-4, Safety of Nuclear Fuel Cycle Facilities require a qualification programme to be implemented for a research reactor facility to verify that to verify that SSCs important to safety are capable of performing their intended functions when necessary, and in the prevailing environmental conditions resulting from accident conditions, throughout their design life, with due account taken of reactor conditions during maintenance and testing."					
8.	USA 8	Section 2, Para 8	Currently reads: "IAEA Safety Reports Series No. 3, Equipment Qualification in Operational … and to take account of feedback from the …." Revise to read: "IAEA Safety Reports Series No. 3, Equipment Qualification in Operational Nuclear Power Plants: Upgrading, Preserving and Reviewing, was published in 1998. The information provided in this Safety Report needs to be updated to be consistent with current safety requirements (e.g. to provide reliable confirmation that SSCs important to safety are capable of the required performance for operational states and for accident conditions), and to take into account of feedback from the Fukushima Daiichi accident, as well as the latest developments in qualification	Editorial suggestion.			x	Instead of SSC we keep 'items important to safety' consistently with SSR 2/1, 2/2, SSR 3 and SSR 4. See above comment resolution.

			methods and industrial standards since the Safety Report was published."					
9.	USA 9	Section 3, Para 1	Revise the first sentence to read as follows: "Several Operational Safety Assessment Review Team (OSART) and Support and Advanced Learning and Training Opportunities (SALTO) missions have identified that…."	Suggested that these acronyms be defined for the benefit of readers that may not be aware of their meaning.	x	Done. SALTO – Safety Aspects of Long Term Operation		
10.	USA 10	Section 3, Para 2	Revise the first sentence to read as follows: "The IAEA does not have a Safety Guide that provides recommendations on equipment qualification to meet Requirement 30 of SSR-2/1 (Rev. 1), Requirement 13 of SSR-2/2 (Rev. 1), Requirement 29 of SSR-3 Requirement 30 of SSR-4, and Requirement 10 of GSR-Part 4 (Rev. 1)."	For consistency with the subsequent paragraphs.	x			
11.	USA 11	Section 3, Para 2	Add a brief overview of the requirements listed in the paragraph.	Suggested revision for the benefit of readers that may not be familiar with the listed requirements.		The details will be provided in the safety guide.	x	The requirements listed in the paragraph already include a description which is a citation from respective SSRs. Perhaps for the purpose of a DPP it is sufficient. The safety guide however, will include a full citation of requirements which will follow by recommendations to meet it.
12.	USA 12	Section 5 Para 1 Line 1	The first sentence of the first paragraph reads:	Section 5 should specify the scope of the new Safety Guide		Term 'Item important to safety' is maintained.	x	

			"This new Safety Guide will primarily address the process for establishing and maintaining equipment qualification programmes in nuclear power plants to provide reliable confirmation that items important to safety are capable of the required performance for operational states and accident conditions." Replace with the following: "This new Safety Guide will primarily address the process for establishing and maintaining equipment qualification programmes in nuclear power plants related to functional capability, seismic conditions, environmental conditions, and electromagnetic interference effects over the full range from normal operating conditions up to and including design-basis conditions to provide reliable confirmation that SSCs important to safety are capable of the required performance for operational states and accident conditions. The new Safety Guide will also provide guidance for the demonstration of the capability of equipment relied upon to perform safety functions in the event of a severe accident at the nuclear power plant."	consistent with the Background section.				
13.	USA 13	Section 6 Last line	Add the following to the list of international standards: ASME Standard QME-1-2017, "Qualification of Active Mechanical Equipment Used in Nuclear Facilities."	The new Safety Guide should reference the most recent ASME QME-1 standard that includes provisions for the qualification of mechanical equipment (such as pumps, valves, and dynamic restraints) used in nuclear facilities. The US NRC is preparing a proposed revision to Regulatory Guide 1.100 to accept ASME QME-1-2017.	x	This safety guide will refer to applicable industrial standards related to both mechanical and electrical equipment.		

14.	USA 14	Section 7	Suggest adding the following as a new item to the proposed Safety Guide contents: "QUALIFICATION DOCUMENTATION".	The intent of this item is to address aspects such as the report(s) that should be produced following completion of the qualification exercise.	x	"Documentation" is included in the scope (see revised ToC).		
15.	USA 15	Section 7	Revise item 7 to read: "ASSESSMENT OF EQUIPMENT CAPABILITY FOR NORMAL OPERATIONAL STATES AND ACCIDENT CONDITIONS"	For consistency with the preceding paragraphs.			x	This language is used only for design extension condition.
16.	USA 16	7.0	Add a section: The proposed Safety Guide will include the following contents: 1. INTRODUCTION 2X .. Categories/Levels in Qualification	A section is needed to explain the different levels of qualification needed, such as safety systems in harsh environment vs. mild environment, equipment that need qualified life, non-safety systems that can support accident mitigation (important to safety) etc.	x	This section is covered in the revised ToC.		
17.	USA 17	7.0	Add to the "Table of Contents," a section outlining recommendations on the development and implementation of documentation of a complete and accurate environmental qualification design basis. Include in this section a discussion on the methods to be used for identifying the appropriate environmental parameters that establish the basis for qualification parameters, identifying required equipment operation mission times, and establishing appropriate recommended margins for each.	Incomplete or inaccurate design basis specification and documentation, or a specification with significant uncertainties, can lead to inadequacies in equipment not being qualified for their intended functions. Since issuance of the existing standards, methods for estimating the limiting bounds of environmental parameters have evolved through the use of advanced computational tools.	x	This section is covered in the revised ToC.		
18.	UK 0	General	Several ONR reviewers consulted on this DPP made similar comments about their uncertainty associated with the scope. While seismic is clearly stated as being outside of scope, it not clear what is within		x	The scope has been better described in the revised DPP. 1. The equipment in the scope includes electrical,		

			scope, in terms of plant states, hazards and types of equipment			instrumentation and controls, electromechanical, active mechanical equipment and installation features associated with this equipment (e.g. connectors, penetrations, seals, mounting equipment), as well as materials of construction which could affect the performance of this equipment including containment wall paint and piping insulation. 2. Piping, structures and other passive components **are not within the scope** of this safety guide because their qualification (safety status) is achieved directly by design, construction, inspection and testing according to applicable codes.		
19.	UK 1	Section 5	Additional text should be added to be clear what is within scope in terms of: – Plant states (normal operation, design basis accident conditions, DEC-A, DEC-B etc) – Modes of operation – at power, shutdown, outages, extended maintenance etc. – Digital I&C, electrical equipment, mechanical components, passive components – Internal and external hazards such as flood, jet-impingement, high temperatures, pressure, humidity, irradiation, missiles, shock, vibration, EM interference, electrical loading, power surges etc.	The first paragraph of Section 5 does mention operational states and accident conditions suggesting quite a broad scope but little else is stated. Section 7 mentions severe accidents but does not provide separation between the qualification for the conditions seen in normal operations and potentially harsher conditions in an accident or due to a hazard. It also needs to be clearer on what equipment is being considered, including whether the intention is to cover passive structures, vessels etc. We would suggest scope is limited to qualifying the	x	Section 5 modified to better describe what operational states and accident conditions it applies, as well as what qualification methods it is subject to. 1. This Safety Guide primarily addresses the process for establishing and maintaining equipment qualification programmes in nuclear installations related to functional capability, seismic conditions, environmental conditions, and electromagnetic interference effects over the full range from normal operating conditions up to and including design basis conditions to provide reliable confirmation		

				‘operability’ aspect of active equipment as is the case for the extant Safety Report Series No. 3. The ‘integrity’ and ‘stability’ aspects of active equipment and passive equipment (structures, vessels, etc) are generally achieved directly by design, construction, inspection and non-destructive testing in accordance with applicable codes.		that items important to safety are capable of the required performance for operational states and accident conditions. 2. Although seismic qualification is an important part of the equipment qualification process, this Safety Guide does not specify seismic qualification methods processes in detail, because such detail is provided in the IAEA Safety Standards Series No. NS-G-1.6 Seismic Design and Qualification for Nuclear Power Plants. 3. The Safety Guide also provides guidance for demonstrating the capability of equipment relied upon to reliably perform safety functions in the event of a severe accident at the nuclear power plant.		
20.	UK 2	Section 2, para 1, 2nd sentence	Equipment qualification is an important design attribute to minimize common cause failures of equipment due to the effect of seismic, electromagnetic interference, harsh environmental and operational conditions resulting from accident conditions.	Should consider both harsh environmental and operational conditions that differ significantly from those normally occurring. Operational conditions generally involve process related conditions and process fluid conditions (e.g. pressure, temperature, chemistry, cavitation, flow rate).	x	Equipment qualification is an important design attribute to minimize common cause failures of items important to safety due to the effect of issues related to functional, seismic, and environmental capability, and potential electromagnetic interference and harsh environmental over the full range from normal operating conditions resulting from accidental to and including design-basis conditions.		

21.	UK 3	Section 6 (linked to Section 4 objectives)	Update wording appropriately.	Section 6 suggests that an Annex will be provided to list relevant standards. Do the ambitions for this guide include identifying/repeating what has already been published in IEC/IEEE 60780-323: 2016, and allowing it to interpreted more generically in other technical areas (eg concepts such as type testing, could be applied beyond the equipment with the scope of the IEC/IEEE standard)? If this is the case, Safety Guide structure as established by the DPP needs to be clear how it and standards such as IEC/IEEE 60780-323: 2016 are intended to be used. This is an important issue for practitioners which should be covered in the guide rather than in an annex as indicated in the DPP.	x	This safety guide will provide a list of relevant industrial standards. This safety guide will address the equipment qualification concepts in a generic way. It will be consistent with, but will not repeat what has already been published in IEC/IEEE 60780-323: 2016, rather it will reference the IEC/IEEE 60780-323: 2016.		
22.	UK - other comments for consideration when drafting the guide: – Whilst the DPP refers to IEC/IEEE 60780-323: 2016 it's important to note that this standard only considers electrical equipment and there may be additional criteria for electronic or mechanical equipment. – The approach adopted by IEC/IEEE 60780-323:2016 allows for consideration of operational experience as an element of the methodology for determining qualification which needs to questioned if there is no clear definition of the operational profile of the equipment subject to qualification. This has been a point of contention within research on programmable electronic equipment justification as its important to compare "like with like" and this needs clarity on the operational profile as it can have an impact. – Value could added if the objective(s) covered qualification applicable at different levels (system, equipment or component level), as well as adding some focus on proportionality in terms of categorisation and/or classification. – The safety guide could introduce the concept of qualification period, which typically for new NPP could be in the region of 40 years, for system, equipment, and components of SSCs based on stable electrical/electronic technologies. This approach has been adopted for qualification of new electronic				x	Agree with the UK comments. DPP amended to better clarify the equipment included in the scope and environmental qualification elements. In this Safety Guide, environmental qualification is qualification for temperature, pressure, humidity, chemical exposure, radiation, submergence, electromagnetic phenomena and ageing mechanisms that affect the proper functioning of components under those conditions.		

	equipment in the UK (Hinkley Point C EPR) on the basis that the claims made need to be capable of being sustained throughout a 40-year period and, as such, it has been decided to pre-age equipment through accelerated testing to achieve this objective. This approach is not particularly well covered by IEC/IEEE 60780-323: 2016 so it could be worth introducing this method into the forthcoming safety guide. Note this concept may not be applicable to qualification of those elements (e.g. platforms) of safety systems based on computer-based technologies as it can be necessary to limit the qualification period to offset the potential for obsolescence. Again, this approach is not particularly well covered by IEC/IEEE 60780-323: 2016 so it could be worth introducing this method into the forthcoming safety guide.					The equipment in the scope includes electrical, electronic, electromechanical and mechanical equipment. Piping, structures and other passive components are not within the scope of this safety guide because their qualification (safety status) is achieved directly by design, construction, inspection and testing according to applicable codes. This safety guide will describe the qualification methods similarly to IEC/IEEE 60780-323: 2016 without going in too much details (e.g. specific numbers) to ensure consensus among MS.		
23.	DE 1	Chapter 2 Para 1 Line 2	The equipment qualification of items important to safety in nuclear installations is a vital part of the installation design basis. <u>It should verify that all items important to safety at nuclear installations are capable of performing their intended functions when necessary, and in the prevailing environmental conditions including all operational states and accident conditions, throughout their design life, with due account taken of plant conditions during maintenance and testing.</u> Equipment qualification is an important design attribute to minimize both common cause failures of equipment due to the effect of seismic, electromagnetic interference and harsh environmental conditions resulting from accident conditions. An incomplete design basis that results in equipment not being qualified for the intended function cannot be solved by redundancy or diversity.	We suggest to add this sentence to focus the behavior of the components in case of accidents – this is an important aspect, yet the qualification should not be limited to that aspect. *Remark: Additions are essentially taken from SSR-2/1, Req. 30.*	x	Provided direct quote from SSR 2/1, Rev.1.		
24.	DE 2	Chapter 2	<u>Equipment qualification should also cover all structures, systems and components</u>	We suggest adding this statement between Para. 2 and	x			

		New Para after Para 2 Line 11	which are installed after the initial start-up of the nuclear installation in the course of modifications, aging management etc.	Para 3. as operating experience (especially recently in Germany) has shown that this issue is highly relevant.				
25.	ENISS 1	2. Background; 1st para	The equipment qualification of items important to safety in nuclear installations is a vital part of the installation design basis. The purpose of qualification is to demonstrate that the equipment can fulfil its required function during accident conditions. ~~Equipment qualification is an important design attribute to minimize common cause failures of equipment due to the effect of seismic, electromagnetic interference and harsh environmental conditions resulting from accident conditions. An incomplete design basis that results in equipment not being qualified for the intended function cannot be solved by redundancy or diversity.~~	The qualification requirement should be more general. The common cause failure can be one of the consequences of a lack of qualification.	x	Section 2 Background rewritten to provide clear description on what purpose the equipment qualification is.		
26.	ENISS 2	2.Background; 2nd para	Equipment qualification includes qualification of structures, systems and components to seismic, environmental and electromagnetic interference effects. The qualified life for a particular equipment type is established ~~by type testing~~ in accordance with methods provided in industrial standards (e.g. IEC/IEEE 60780/323). The qualified life…	IEC/IEEE 60780-323 allows also other methods than testing (e.g. by analysis)	x	….by type testing, analysis, or a combination of testing and analysis...		

27.	ENISS 3	5.Scope; 2nd para	Seismic qualification is out of scope; however this publication will reference IAEA Safety Standards Series No. NS-G-1.6, Seismic Design and Qualification for Nuclear Power Plants, as it is the only existing Safety Guide that provides recommendations on equipment qualification specific to seismic design and qualification for nuclear power plants (SG under DS490 revision).	It's important to remind that NS-G-1.6 is under revision.	x			
28.	ENISS 4	6.	This new specific Safety Guide will interface with the following IAEA Safety Standards and other publications: – SSR-2/1 (Rev. 1): Safety of Nuclear Power Plants: Design – DS508 : Application of Safety Principles and General Design Requirements for NPPs – SSR-2/2 (Rev. 1): Safety of Nuclear Power Plants: Commissioning and Operation – SSR-3: Safety of Research Reactors SSR-4, Safety of Nuclear Fuel Cycle Facilities – GSR Part 2: Leadership and Management for Safety – DS513 : Leadership, Management and Culture for Safety – GSR Part 4 (Rev. 1): Safety Assessment for Facilities and Activities – SSG-25: Periodic Safety Review for Nuclear Power Plants – SSG-34: Design of Electrical Power Systems for Nuclear Power Plants	Future safety guides should be referenced, and indications on safety standards under revision are added.	x			

			– SSG-39: Design of Instrumentation and Control Systems for Nuclear Power Plants – DS449: Format and Content of the Safety Analysis Report – DS485 (SSG-48): Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants – DS483: Severe Accident Management Programmes for Nuclear Power Plants – Safety Report No.3: Equipment Qualification in Operational Nuclear Power Plants: Upgrading, Preserving and Reviewing – DS498 (NS-G-1.5): External Events Excluding Earthquakes in the Design of Nuclear Power Plants – DS490 (NS-G-1.6): Seismic Design and Qualification for Nuclear Power Plants					
29.		6.	The Annex to the Safety Guide will provide a list of relevant international standards that have strong relation with this Safety Guide, in particular: – IEC 61000-4 (all parts), Electromagnetic Compatibility (EMC) – Part 4: Testing and measurement techniques – IEC 62003 -– Nuclear Power Plants – Instrumentation and control important to safety – Requirements for electromagnetic compatibility testing – IEC 62342 NPP - I&C important to safety - Management of ageing	As the Safety Guide will address EMC effects, EMC testing standards applied to electrical equipment qualification shall be referred to. Possibly complete the list with other relevant standards (e.g. IEC 62342) as the draft progresses	x			
30.	JP 1	3. JUSTIFICATION 2nd paragraph Bullet 2	Suggested to show inconsistencies identified during preparing this DPP showing some gaps among SSG-34, SSG-39 and SSG-48 as examples.	Those who involved in developing Safety Guides (e.g. SSG-34, SSG-39, SSG-48) had paid efforts to avoid any discrepancy among each publication.		This para explains that 'current status leads to inconsistencies in the depth of guidance' provided in different IAEA publications. The concern here is the depth of guidance (scope, qualification	x	

				Section of "Justification" of this DPP should introduce some evidence of inconsistencies.		methods, qualification programmes) provided in different IAEA safety standards. For example: SSG-34 addresses qualification of electrical equipment, SSG-39 qualification of I&C equipment and SSG-48 addresses equipment qualification in general as a part of ageing management process. The new safety guide will not contradict the previous safety guides. It will facilitate common understanding on equipment qualification concept, process and methods for establishing and preserving the equipment qualification in operational nuclear installations, documentation, reviewing/assessing the effectiveness of a specific equipment qualification programmes.		
31.	JP 2	4. OBJECTIVE: 2nd sentence	The target audience of this publication are engineers, operators, researchers, managers, and personnel responsible for all aspects of equipment qualification of items important to safety for nuclear power plants installations.	To keep a consistency with the title.	x			
32.	JP 3	5. SCOPE 1st para.	This new Safety Guide will primarily address the process for establishing, and maintaining and revising equipment qualification programmes in nuclear power plants to provide reliable confirmation that items important to safety are capable of the required performance for operational states and accident conditions, with accounting applicability and appropriateness in accordance with respective facilities states. Recommendations provided in this new Safety Guide can also be considered for	1) The Guide will be utilized through the plant life time, and upgraded/added equipment during the life time needs to be incorporated. 2) The certification level on the "performance", when taking into account uncertainty, is different for AOO/DBA and for DEC. The former is based on "conservative" manner,	x	Scope rewritten along with USA comments. 1) accepted, 2) all plant states are included in the scope; a description of methods for applicable to different plant states will be in the safety guide; 3) SSR-4 is referenced in the DPP.		

			other nuclear installations (e.g. small modular reactors, research reactors, fuel cycle facilities).	whereas the latter is on “best estimate” one. 3) Fuel cycle facilities should be added as nuclear installations.				
33.	JP 4	6. PLACE in …	Suggested to add SSG-30: “Safety Classification of Structures, Systems and Components in Nuclear Power Plants” and TECDOC-1787: “Application of the Safety Classification of Structures, Systems and Components in Nuclear Power Plants” as interface documents.	The initiator of qualification comes from classification, as stated in “2.BACKGROUND” in its 7th paragraph.	x			
34.	JP 5	6. PLACE in …	Suggested to add some mechanical standards in addition to standards of IEC/IEEE and IEEE.	Qualification of mechanical equipment are provided in mechanical code such as ASME, RCC-M and JSME.	x	Section 5 Scope improved along with USA and UK comments. 1. This Safety Guide primarily addresses the process for establishing and maintaining equipment qualification programmes in nuclear installations related to functional capability, seismic conditions, environmental conditions, and electromagnetic interference effects over the full range from normal operating conditions up to and including design basis conditions to provide reliable confirmation that items important to safety are capable of the required performance for operational states and accident conditions. 2. Although seismic qualification is an important part of the equipment qualification process, this Safety Guide does not specify seismic qualification methods processes in detail, because such detail is provided in the IAEA Safety Standards Series No. NS-G-1.6		

						Seismic Design and Qualification for Nuclear Power Plants. 3. The Safety Guide also provides guidance for demonstrating the capability of equipment relied upon to reliably perform safety functions in the event of a severe accident at the nuclear power plant. 4. The equipment in the scope includes electrical, instrumentation and controls, electromechanical, active mechanical equipment and installation features associated with this equipment (e.g. connectors, penetrations, seals, mounting equipment), as well as materials of construction which could affect the performance of this equipment including containment wall paint and piping insulation. 5. Piping, structures and other passive components are not within the scope of this safety guide because their qualification (safety status) is achieved directly by design, construction, inspection and testing according to applicable codes. 6. This safety guide will refer to ASME QME-1-2017 Qualification of active mechanical equipment used in nuclear facilities.		

35.	Korea 1	Section 7 / Line 3-5	Change the order of contents proposed in Section 7: Currently proposed contents: *"7. OVERVIEW* *The proposed ….* *1. INTRODUCTION* *2. CONCEPT AND PROCESS OF EQUIPMENT QUALIFICATION* *3. ESTABLISHING AN EQUIPMENT QUALIFICATION PROGRAMME* *4. METHODS FOR EQUIPMENT QUALIFICATION* *5. PRESERVING EQUIPMENT QUALIFICATION* *6. UPGRADING EQUIPMENT QUALIFICATION* *7. ASSESSMENT OF EQUIPMENT CAPABILITY FOR SEVERE ACCIDENTS* *8. EVALUATION OF THE EFFECTIVENESS OF EQUIPMENT QUALIFICATION"* Revised new contents: *"7. OVERVIEW* *1. INTRODUCTION* *2. CONCEPT AND PROCESS OF EQUIPMENT QUALIFICATION* *3. METHODS FOR EQUIPMENT QUALIFICATION* *4. ESTABLISHING AN EQUIPMENT QUALIFICATION PROGRAMME* *5. PRESERVING EQUIPMENT QUALIFICATION* *6. UPGRADING EQUIPMENT QUALIFICATION* ~~*7. ASSESSMENT OF EQUIPMENT CAPABILITY FOR SEVERE ACCIDENTS*~~ *7. EVALUATION OF THE EFFECTIVENESS OF EQUIPMENT QUALIFICATION"*	It is recommended that EQ phases be arranged in a row. The structure of the new safety guide would be well balanced if Chapter 4 'Methods for EQ' is moved before Chapter 3 'Establishing EQ'. The guidelines on 'Assessment of EQ for severe accidents' can be included in other chapters, and thus Chapter 7 is suggested to be deleted	x	The Table of Contents is revised along with NUSSC members comments.		

36.	PAK 1	2.Background / Para 3	IAEA Safety Standards Series No. SSR-2/1 (Rev. 1), Safety of Nuclear Power Plants: Design, IAEA Safety Standards Series No. SSR-3, Safety of Research Reactors, and IAEA Safety Standards Series No. SSR-4, Safety of Nuclear Fuel Cycle Facilities, require a qualification programme to be implemented for nuclear facility to verify that items important to safety are capable of performing their intended functions when necessary, and in the prevailing environmental conditions, throughout their design life, with due account taken of reactor conditions during maintenance and testing.	To harmonize with the text used in SSR 2/1.	x			
37.	PAK 2	2.Background / Para 5	Deleted	As it already covered in comment 1 above	x	This section has been modified along with NUSSC comments.		
38.	PAK 3	7. Overview	General	Subheadings of main headings should be provided for review	x	The Table of Contents is revised along with NUSSC members comments.		
39.	FRA 1	Title	Equipment Qualification programmes of Items Important to Safety in Nuclear Installations	To be consistent with the objective in chapter 4 and the requirement from SSR-2/1, SSR-3 and SSR-4 which are particularly enhanced in this DPP		Title of requirements in SSR 2/1, SSR 3, SSR 4 reads: Qualification of item important to safety…. Title of requirement 13 of SSR 2/2 reads: Equipment qualification	x	
40.	FRA 2	All	**Please clarify the scope:** Title: "…Important to Safety in Nuclear Installations" Chapters 2, 3, 4, 6 mention SSR-2/1, SSR-3, SSR-4 Chapter 4: "The target audience of this publication are … responsible for all aspects of equipment qualification of items important to safety for **nuclear power plants**" Chapter 5: "This new Safety Guide will primarily address the process for establishing and maintaining equipment qualification programmes in **nuclear**	Title and most of the chapters cover all nuclear installations. Chapter 5/Scope mention NPP then says that the guidance can be apply to other installations. The examples mentioned are SMR which are still NPP and RR, forgetting other nuclear installations.	x	Term 'Nuclear installations' is used consistently through the DPP, unless it is directly quote from the IAEA Safety Standards (e.g. SSR 2/1, Rev. 1 which is meant for NPPs).		

			power plants… Recommendations provided in this new Safety Guide **can** also be considered for other nuclear installations (e.g. small modular, reactors, research reactors)"					
41.	FRA 3	2 (line 2)	Equipment qualification is an important design attribute to minimize ~~common cause~~ failures of equipment due to the effect of seismic, electromagnetic interference and harsh environmental conditions resulting from accident conditions.	The goal of qualification is not only the prevention of common cause failure (according to the definition of equipment qualification in the safety glossary). Consider also to simply replace this sentence by the definition	x	Clarified along with USA, DE, ENISS comments.		
42.	FRA 4	2 (line 7)	The qualified life for a particular equipment type is established by several ways: type testing, operating experience or analysis in accordance with methods provided in industrial standards (e.g. IEC/IEEE 60780/323) .	There are other methods that type testing See IEC 60780 : « Qualification may be accomplished in several ways: type testing, operating experience or analysis. These may be used individually or in any combination depending upon the particular situation" (note that it is also consistent with the current draft of an ETSON guidance related to environmental qualification)	x	The qualification methods listed in accordance with methods provided in industrial standards (e.g. IEC/IEEE 60780/323)		
43.	FRA 5	7	3. ESTABLISHING AN EQUIPMENT QUALIFICATION PROGRAMME This chapter will consider as far as necessary the expectations for ~~4.~~ METHODS FOR EQUIPMENT QUALIFICATION, ~~5.~~ PRESERVING EQUIPMENT QUALIFICATION and ~~6.~~ UPGRADING EQUIPMENT QUALIFICATION	To ensure consistency with the scope	x	Revised TOC addresses this comment.		
44.	FRA 6	7	7. ASSESSMENT OF EQUIPMENT CAPABILITY FOR SEVERE ACCIDENTS	Consider deletion: • Capability is not clear (is it a downgraded qualification? Thus not	x	Equipment relied upon to perform safety functions in the event of design extension conditions with core melting should also be demonstrated		

				consistent with requirements) This part of qualification programme should be dealt in other chapters.		to be capable of performing those functions using implementation of a qualification programme. However, given the potential uncertainties of conditions during design extension conditions with core melting, the demonstration of this capability can be done using realistic analyses, considering uncertainties and margins as appropriate regarding the definition of these conditions.		
45.	FRA 7	7	8. EVALUATION OF THE EFFECTIVENESS OF EQUIPMENT QUALIFICATION	Consider deletion or the content of the chapter should be clarified whilst "effectiveness" is not clear and whilst recommendations of previous chapters aim at establishing and maintaining an adequate qualification programme.	x	Section content was developed in greater details to provide evaluation attributes of equipment qualification programme (similarly what is provided in SRS No.3). This section includes: – Purpose and scope – Periodic reviews and audits – Ongoing routine assessment and inspections Validation and verification of the qualification processes has to be verified during the entire [period of a qualified life.		