Master Resolution Table of Comments

DS516: CRITICALITY SAFETY IN THE HANDLING OF FISSILE MATERIAL

COMMENTS BY REVIEWER Reviewer: Page… Country/Organization: Date: June 2020					RESOLUTION			
Comm. No.	**Country**	**Para/ Line No.**	**Proposed new text**	**Reason**	**Accepted**	**Accepted, but modified as follows**	**Rejected**	**Reason for modification/rejection**
1.	AUS009	general	In general the document would benefit from improvement in terms of structure and flow of information.	Some key American Nuclear Society standards are listed at end of the document but they are not properly reflected in the text. The main example is, Section 6, Emergency planning and response: all references are to the IAEA documents which are general, but ANSI standard is specific to Emergency response to criticality accident, which is not reflected in the text.	X			
2.	AUS010	general	suggest replace all in-line references to SSRs by “shall”	In-line references seem untidy and unnecessary.	X			
3.	FIN001	General	Please add following ISO standards ISO 1709 Principles of criticality ISO 22946 Solid waste excluding irradiated and non-irradiated nuclear fuel ISO 23133 Nuclear criticality safety training for operations	These standards are relevant to this subject	X			

4.	GER001	General	<u>*General:*</u> In this document several terms are used which are not defined in the IAEA Safety Glossary 2018 Edition, for example: - abnormal condition - outside normal operation - abnormal events We suggest sticking to defined terms for the plant states: • "normal operation" • anticipated operational occurrences" • "design basis accidents" as well as • "design extension condition" in accordance with the IAEA Glossary	Being aware that also in SSR-4 the applied terminology differs from the IAEA Safety Glossary, please use a terminology in accordance with the IAEA Glossary and avoid using undefined terms to prevent unnecessary confusion.		X		"abnormal events" was replaced; term "credible abnormal conditions" is in line with SSR-4 and it is the correct term used in criticality safety
5.	GER002	General	<u>*General:*</u> Issue „Defence in depth" of the Section 3 "Measures for Ensuring Criticality Safety" requires further review, clarification and probably discussion in order to be put in accordance with the defence in depth concept provided in SSR-4. We found it difficult to make appropriate changes in the frame of current MS-Commenting	Paras 3.2-3.3 are not in line with the defence in depth concept provided in SSR-4. Additional review is requested	X			The text was updated.

6.	JPN002	General	There are some missing paragraphs numbers and places found as followings, so should be corrected accordingly. 1) For 2.9.: 2.8./L6: ~~2.1.~~ 2.9. and 2.9/L1: ~~2.5~~2.9 2) For 2.16.: MANAGEMENT STSTEM/L2: ~~2.2.~~ 2.16. and /L10: ~~2.10~~2.16 3) For 2.31.: 2.30./L8: 2.31. and 2.31./L1: ~~2.12~~ 2.31 4) For 3.3.: 3.2./L9: ~~3.1.~~ 3.3. and 3.2./L14: 3.3 5) For 5.87.: 5.86./L9: ~~5.1.~~ 5.87. and 5.86./L19: 5.87 6) For 6.5.: 6.4./L5: 6.5.and 6.4/L11: 6.5	editorial	X			
7.	RUS015	General	Point after "para" and "paras"	misprints	X			
8.	SVK003	General	„enrichment"	It is suggested to keep this parameter of nuclear fuel even though it is included in another definition.		X		It is mentioned in the explanation of "nuclide composition"
9.	UK001	General	Ensure all terms used are within a glossary	Some terms used within the document are not defined in [9], e.g. 'minimum accident of concern'	X			
10.	UK032	General	A glossary defining terms not defined in the IAEA glossary would be beneficial.	Avoidance of confusion – not all terms have universally	X			

11.	USA007	General Throughout the document	**Technical:** Throughout the document, there is no consistency when referring to normal and credible abnormal conditions. The working group, based on other industry standards and adopted language, has strongly suggested that the terms “normal and credible abnormal conditions” is correct and should be adopted. All places where this isn’t the exact language used (for example, Para 1.2, “…ensure criticality safety under operational states and conditions that are referred to as….”) should be changed to “normal and credible abnormal conditions”).	Terminology should be clear, succinct, correct, and consistent. Currently, it is none of these things.	X			
12.	WNTI01	General	“transportation” and “shipment” should be replaced by “transport”.	Editorial Consistency in the document	X			
13.	RUS014	General All over the text		misprints	X			
14.	JPN001	CONTENTS	6. EMERGENCY PREPAREDNESS AND RESPONSE TO A CRITICALITY ACCIDENT	To keep a consistency with the title of chapter 6.	X			
15.	RUS001	Contents	Contents do not follow the text, numbers of pages are not correct.	editorial	X			
16.	SVK001	1.01	Definition of „fissile“: Fissile nuclides are nuclides, in particular 233U, 235U, 239Pu and 241Pu, that are able to support a self-sustaining nuclear chain reaction with neutrons of all energies, but predominantly with slow neutrons	We propose to keep this definition, not to delete it. It is important for the complex reading and expertise of the document.			X	The definition is already in the AIEA Safety Glossary

17.	SVK002	1.01	Definition of „fissile material“: Fissile material refers to a material containing any of the fissile nuclides in sufficient proportion to enable a self-sustained nuclear chain reaction with slow (thermal) neutrons	We propose to keep this definition, not to delete it. It is important for the complex reading and expertise of the document.			X	See the previous comment
18.	USA001	1.01 line 1	Nuclear criticality can be achieved under certain conditions by fissionable nuclides.	This is not “theoretical,” it is essentially the definition fissionable.	X			
19.	CAN001	1.02	Technical: Revise language in the following way: “This requirement applies to facilities ~~including those~~ engaged in the production of fresh nuclear fuel including enrichment and fuel fabrication, facilities dealing with spent nuclear fuel….”	This SSG also covers enrichment facilities, which the current text neglects.	X			

20.	CAN002	1.02	Technical: … are required to be managed in such a way as to ensure criticality safety under normal conditions, ~~operational states~~ and conditions that are referred to as credible abnormal conditions…	The aim of the SSG-27 is to provide technically sound interpretation and further guidance on SSR-4 content. In view of that, criticality safety experts clarified during the consultancy meetings on revision of SSG-27 that term “operational states” - is not applicable to the prevention of criticality because the term permits accidents. It includes 2 components “normal operations” and AOO. AOO, by its definition, means a very small accident with relatively high frequency and relatively low consequences. See, as illustration, Canadian REGDOC-2.4.1, where AOO frequency of occurrence is defined as >10E-2, that includes a very small LOCA with “radiological doses to the members of the pubic”. This is not consistent with the meaning of the requirement to prevent criticality accident. - is not consistent with terminology used in national and international standards on	X			

				criticality safety adopted or recognized by the most member states. Examples of standards: ISO-1709, ANSI/ANS-8.1, Canadian REGDOC-2.4.3, Chinese GB 15146.2. Other member states use some of the mentioned above, for example, UK uses both ISO-1709 (issued through BSI) and ANSI/ANS-8.1. - two different terms are used in the SSG-27 draft to identify the same thing.				
21.	FIN002	1.02	/9… spent nuclear fuel and to ~~some~~ research and development facilities where fissile material is handled. Another alternative would be "… to such research and development facilities that handle fissile material".	Why would this concern just some research facilities? How would the facilities be defined to which this applies?	X			
22.	GER003	1.02	Nuclear facilities containing fissile material, and activities in which fissile material is handled, are required to be managed in such a way as to ensure criticality safety under operational states and <u>under</u> conditions that are referred to as credible abnormal conditions or conditions included in the design basis in accordance with….	"under" inserted; clarify that two different conditions are meant	X			

23.	UK002	1.02	Suggest removing text from 'This requirement applies…' onwards, or revising section to make it clearer that these are examples of the types of facilities that the requirements would apply to.	This section is unnecessarily specific about facilities where the requirements apply. It leads to uncertainty in whether certain types of operations are included, e.g. enrichment facilities, weapons facilities etc.			X	Precise specification of the scope of applicability is an essential element of all IAEA Safety Standards.
24.	USA008	1.02	**Technical:** Revise language in the following way (added text in RED): "This requirement applies to facilities ~~including those~~ engaged in the production of fresh nuclear fuel including enrichment and fuel fabrication, facilities dealing with spent nuclear fuel…."	This SSG also covers enrichment facilities, which the current text neglects.	X			
25.	GER005	1.02 Line 11	~~All types of operation h~~ Handling fissile material comprises all activities ~~are covered,~~ including its movement, processing, use, storage, inspection and disposal.	Clarification and wording amendment in accordance to para 1.8.		X		The definition of HANDLING left in 1.8 only
26.	GER004	1.02 Line 6	… This requirement applies to all types of facilities that involve handling of fissile material including those engaged in the production of fresh nuclear fuel, except those that are intentionally designed to be critical, ~~facilities dealing with spent nuclear fuel~~ and to ~~some~~ those research and development facilities where fissile material is handled.	Clarification and wording amendment in accordance to para 1.8. For clarification, the term 'some' should be replaces or deleted.		X		The text was modified to accept multiple comments.
27.	UK003	1.02, 1.6, 1.8	Use consistent wording for where the requirements apply.	Sections 1.2, 1.6 and 1.8 all define where the requirements applies, but all use different wording or criteria.	X			

28.	FRA001	1.02.	… are required to be managed in such a way as to ensure criticality safety under normal conditions, ~~operational states~~ and conditions that are referred to as credible abnormal conditions…	The use of “operational states” is not consistent through the doc. It’s mainly used to replace “normal conditions” (like in this statement), but by definition, it includes 2 components “normal operations” and “anticipated operational occurrences”. This may lead to confusion. Prefer the widely used expression in NCS: “normal and credible abnormal conditions” (ISO-1709, ANSI/ANS-8.1, etc.).	X			
29.	TUR001	1.02/ Line 11	All types of operation handling fissile material are covered, including its movement, processing, storage~~,~~ ~~inspection~~ and disposal.	Inspection is not considered as a handling operation.		X		This provision was deleted from para 1.2. “inspection” was deleted from 1.8
30.	SWE01	1.02/2	… to ensure an adequate margin of subcriticality	Term used in SSR-4. Criticality safety (emergency preparedness) includes accident conditions that are not credible. That is not covered by this sentence.	X			
31.	CZE001	1.02/3	…under operational states and conditions ~~that are reffered to as credible abnormal conditions~~ included in the design basis…	Credible abnormal conditions are included in design basis			X	The wording corresponds to SSR-4

32.	SWE02	1.02/7 1.12/3 1.13/10 4.26(d)(v)/2 5.2(b)/2 Subtitle 5.30 5.30/1 + 2 5.30(b)/1 5.30(d)/1 5.33/1 5.35/1+5 5.36/1 Subhead 5.38 5.38/1,3,4,6 5.40/1 5.41/1+4 Subhead 5.43 5.43/1*2 5.45/8 5.46/1+2 5.47/1 5.47(a)/1	Replace “spent” with “irradiated”	Term used in para. 6.195 of SSR-4. “spent” is limited to fuel that will not be irradiated in a reactor again. “Irradiated” is more general, as is this guide.		X		The term was replaced where appropriate. At some places it is more appropriate to refer to spent fuel. In addition, the applicability to irradiated fuel in general is also made in Section 5.

		5.47(c)/ 1 5.48/5+ 6 5.48(a)/ 1 5.48(b)/ 1+2 5.49/1						
33.	FRA002	1.03	including its mass, nuclide composition, physical and chemical form, geometry, volume, enrichment and density	Physical and chemical form of the fissile medium may have an impact on its reactivity	X			
34.	ENISS1	1.03 (1st sentence)	The subcriticality of a system depends on many parameters relating to the fissile material, including its mass, nuclide composition, geometry, ~~volume~~, physico-chemical form and density.	1.) Physico-chemical form is very important in the determination of critical masses; it refers also to the concept of "reference fuel" of the system which should be added here. (see Comment N° 2) 2) The "volume" is already included in the "geometry" parameter.		X		"Chemical form" added following also other comments

35.	ENISS2	1.03 (from 2nd sentence on)	Subcriticality is also affected by the presence of other materials such as neutron moderators, absorbers and reflectors. After having defined the reference fuel for the system under study, subcriticality can be ensured through the control of an individual parameter or a combination of parameters, for example, by limiting mass alone or by limiting both mass and moderation.	The definition of "limiting value" of a parameter (limiting mass, ...) must be associated to the definition of the "reference fuel" of the system under study. Different "reference fuels" (with different enrichment, physico-chemical form, geometry, …) can be associated to the same "system", and therefore giving a limiting value alone is not sufficient to characterize the subcriticality limit.			X	We agree, however this is a very general introductory section and therefore should not contain too much technical details. This is for later sections. The sentence even without the suggested text is a true statement. The suggested addition would call for more explanation of "reference fuel".
36.	FRA003	1.03 (2.2) (2.8) (2.11)	The subcriticality of a system depends on many parameters relating to the fissile material, including its mass, nuclide composition, geometry, volume, chemical form and density.	Chemical form is also an important (and less obvious) parameter that have an impact on the subcriticality of a system	X			
37.	CAN003	1.03, 2.2, 2.8, 2.11, 3.15	Editorial: […] nuclide composition, density, mass, concentration, moderation, geometry, neutron absorption, neutron reflection or neutron interaction […]	The lists of parameters are not consistent through the doc (between 1.3, 2.2, 2.8, 2.11, 3.15), even if these lists are introduced by "such as", it's better to be consistent and to try to keep the same order and designation.	X			
38.	FRA004	1.03, 2.2, 2.8, 2.11, 3.15	[…] nuclide composition, density, mass, concentration, moderation, geometry, neutron absorption, neutron reflection or neutron interaction […]	The lists of parameters are not consistent through the doc (between 1.3, 2.2, 2.8, 2.11, 3.15), even if these lists are introduced by "such as", it's better to be consistent and to try to keep the same order and designation.	X			

39.	BE001	1.03, 2.2., 2.8	1.3 The subcriticality of a system depends on many parameters relating to the fissile material, including its mass, nuclide composition, geometry, volume, temperature and density. Subcriticality is also affected by the presence of other materials such as neutron moderators, absorbers and reflectors and dynamic effects (in particular for fluids). 2.2 Subcriticality is generally ensured through the control of a limited set of macroscopic parameters such as mass, concentration, moderation, geometry, nuclide composition, enrichment, temperature, density, and neutron reflection, interaction or absorption and control of dynamic effects (in particular for fluids). 2.8 Safety criteria based on the critical value6 of one or more control parameters, such as mass, volume, concentration, geometry, moderation, reflection, interaction, nuclide composition, temperature ~~and~~, density and control of dynamic effects (in particular for fluids). 2.11 These parameters include mass, density, concentration and nuclide composition, as well as the geometry, neutron moderation or reflection of the system, and the neutron absorption characteristics of the fissile material mixture and other	Temperature plays a fundamental role in criticality. For 2.11, temperature is mentioned but seems to concern only the ‘flow’. Dynamic effects in liquid for example should also be taken into account (see for instance Cecil Kelley criticality accident).	X			

			system materials, liquid flow rates and temperature.					
40.	TUR002	1.03/ Line 3	Subcriticality is also affected by the presence of other materials such as neutron moderators, **neutron** absorbers and **neutron** reflectors.	In order to stress that absorbers and reflectors are meant to be for neutrons.	X			
41.	SWE03	1.04/1+2	1.4 In this safety guide, the phrase “nuclide composition” encompasses all the nuclides accounted for in a specific application. Nuclide compositions may be inferred by natural element specifications (e.g. light water, stainless steel SS304). "Isotopic composition" covers isotopic mass fractions or isotopic abundances of a specific element accounted for and covers terms such as "enrichment", "effective enrichment" and "plutonium vector".	Both nuclide and isotope are important specifications and have different meanings.		X		The proposed terms are both included in the current definition of “nuclide composition”.
42.	FRA005	1.06	Ensuring, and demonstrating, subcriticality under normal	The objective of the SG includes the assessment, which has an aim of demonstration	X			

43.	FRA006	1.06	Ensuring subcriticality … · Estimating … · Minimizing …	Exchange the "Estimating" sentence and the "Minimizing" sentence because it seems more difficult to minimizing something you have not estimated yet.	X			
44.	FRA007	1.06	under normal and credible abnormal conditions or conditions included in the design basis	To be consistent with the rest of the document and the SSR-4	X			
45.	GER006	1.06	The objective of this Safety Guide is to provide guidance and recommendations on meeting the relevant requirements for: • Ensuring subcriticality under normal and credible abnormal conditions or conditions included in the design basis; • Minimizing the consequences if a criticality accident were to occur; • Estimating the credible consequences of a potential criticality accident.	The criticality safety has to be ensured in conditions included in the design basis as well - such events may have the potential to reach criticality (see Para.2.3), but according to the defence-in-depth concept, there should be measures to prevent this		X		Credible abnormal conditions are included in the design basis
46.	CAN004	1.08	Technical: Revise language in the following way: …dealing with fissile material including its processing, use, inspection, storage, disposal and transport as well as the management of radioactive waste containing fissile material.	Para 1.8 should explicitly note disposal, since it is explicitly mentioned in para 1.2.	X			
47.	FRA008	1.08	except those that are intentionally designed to be critical, for example a reactor core in a nuclear reactor,	Are the loading / unloading phases of the reactor included in the exemption? If yes, we should mention it in the text.	X			The answer is NO, these are not included in the exception.

48.	UK033	1.08	… the handling (ie the receipt, inspection, storage, internal transport, processing) of fissile material …	Defines the term “handling”		X		
49.	WNTI02	1.08	1.8 In this publication, ‘handling of fissile material’ refers to all activities dealing with fissile material including its processing, use, inspection, storage, and on-site transport as well as the management of radioactive waste containing fissile material.	On-site transport and off-site transport should be distinguished. All recommendations and guidance for off-site transport should be provided in SSR-6 and SSG-26. This document should focus on on-site transport because readers of it are regulators, operators and so on for facilities.	X			
50.	GER007	1.08 Line 3	… In this publication, ‘handling of fissile material’ refers to all activities dealing with fissile material including its processing, use, inspection, storage, ~~and~~ transport, and disposal as well as the management of radioactive waste containing fissile material.	Also, in disposal the criticality safety needs to be considered. Suggestions: The same word sequence could be used in 1.2 and 1.8 for consistency.	X			

51.	TUR003	1.08/ Line 4	... dealing with fissile material including its processing, use, inspection, storage, and transport as well as the …	It is considered that the term “use” for fissile materials includes irradiation for most cases. Irradiation of fissile materials are mostly occur in critical state. This seems to contradict the state in Para 1.8/ Line 1&2 “This Safety Guide applies to all types of facilities and activities that involve handling of fissile material, except those that are intentionally designed to be critical”.		X		There are facilities where nuclear material is irradiated and still under critical, for example R&D facilities.
52.	CAN005	1.09	Technical: Revise language in the following way: The recommendations provided in this Safety Guide cover criticality safety during normal conditions ~~operation~~, and during credible abnormal conditions…	Inconsistency of terminology, see also comment 2 on para 1.2 for related technical comment.	X			
53.	CAN006	1.09	Editorial: It also applies to the design and operational phases of waste disposal. This Safety Guide also provides recommendations on planning the response to a criticality accident	Add space between to and the “applies to the design”	X			
54.	EGY001	1.09 Line 4	It also applies to the design	Space should be left between to the design	X			
55.	FRA009	1.09	This Safety Guide also provides recommendations on planning the response ~~to~~ a in case of a criticality accident	Suggestion	X			

56.	FRA010	1.09	It also applies to the design	Missing space	X			
57.	GER008	1.09	The recommendations provided in this Safety Guide cover criticality safety during normal operation and during credible abnormal conditions <u>or conditions included in the design basis</u>, from initial design, through commissioning, operation, and decommissioning.	The criticality safety has to be ensured in conditions included in the design basis as well.		X		Credible abnormal conditions are part of the design basis
58.	IND001	1.09	**Suggestion:** Guidance on criticality hazard analysis and aspects such as quantification of occupational exposure and radiological impact on public and the environment of a potential criticality accident be included in the safety guide.	General suggestion			X	The scope of amendment has been approved in the DPP.
59.	RUS002	1.09	It also applies to the design and operational phases of waste disposal.	Misprints/edits	X			
60.	UK004	1.09	It also applies to the design…	Need to include a space between "to" and "the"	X			
61.	UK005	1.09	…operational phases of waste disposal (not including post-closure).	To make it clear that post closure situations are not considered as part of the operational phase of waste disposal		X		Post-closure is included in Section 5. The text in 1.9 was modified to capture this.
62.	FRA011	1.09 and 1.10	… <u>emergency</u> response to …	Include "emergency" term because this term is used in the document.	X			
63.	GER009	1.09 Line 4	… It also applies to the design and operational phases of ~~waste~~ disposal <u>facilities</u>.	The design and operational phases refer to a disposal facility and not to the emplacement process (disposal).	X			

64.	TUR004	1.09/ Line 4	It also applies to the design	Minor correction for the sentence. (should put a space between to and the)	X			
65.	TUR005	1.09/ Line 4	… and operational phases of ~~waste~~ disposal **of radioactive waste containing fissile material**.	The scope of this document is the waste that contains fissile materials.	X			
66.	CAN007	1.10	Technical: Revise language in the following way: The recommendations provided in this Safety Guide encompass: approaches to and criteria for ensuring subcriticality~~;~~ ~~estimating credible fissile chain scenarios,~~ identification of credible abnormal conditions; conducting criticality safety assessments; ~~, including~~ validating of calculation methods; specifying safety measures to ensure subcriticality; management aspects, and response to criticality accidents.	There are 2 proposed changes: 1. Replacement of "estimating credible fission chain scenario" by more accurate "identification of credible abnormal conditions" 2. Removal of "including". The current wording is confusing and technically inaccurate; it suggests that the validation of calculational methods is a part of criticality safety assessments, which is inaccurate.	X			
67.	FRA012	1.10	The recommendations provided in this Safety Guide encompass: approaches to and criteria for ensuring subcriticality; estimating credible fissile chain scenarios, identification of credible abnormal conditions; conducting criticality safety assessments; , including the validating of calculation methods; specifying safety measures to ensure subcriticality; management aspects, and response to criticality accidents.	1. "estimating credible fissile chain scenarios" is unclear, prefer using the terminology used elsewhere in the text "identification of credible abnormal conditions". 2. the validation of calculation methods is not "included" in criticality safety assessments.	X			

68.	USA009	1.10	**Technical:** Revise language in the following way (added text in RED): "The recommendations provided in this Safety Guide encompass: approaches to and criteria for ensuring subcriticality; identification of abnormal conditions and credible accident scenarios; conducting criticality safety assessments; the validation of calculational methods…."	The current language is confusing and arguably technically inaccurate. Secondly, the current language suggests that the validation of calculational methods is a part of criticality safety assessments, which is inaccurate.	X			
69.	SWE04	1.10/2	fission chain reactions	"fissile chain" does not sound correct.	X			
70.	IND002	1.10/3	"including the validation of calculation methods" to be replaced with "including the verification/ benchmarking /validation of calculation methods"	It is not always possible to carry out validation of calculation methods for every criticality safety evaluation for a facility. It can be simply referred to verification with simpler model, benchmarking, etc.	X			
71.	WNTI03	1.11	In cases where criticality safety is specifically addressed by regulations, for example, the off-site transport of fissile material in accordance with SSR-6 (Rev. 1) [6],…	SSR-6 and SSG-26 address off-site transport and on-site transport is out of scope from those documents.	X			
72.	UK035	1.12	"for example, and handling of fresh fuel"	Storage of fuel should not be excluded from scope.	X			We agree, "handling" includes storage.
73.	EGY002	1.13 (line 12 of para 1.13)	….and decommissioning , transport of fissile material , and research , experimental test and development laboratories.	Experimental test may be added.		X		This para does not list the types of facilities, therefore experimental tests and R&D labs are also included.
74.	FRA013	1.13	provides an introduction to the ~~processes~~ factors that affect criticality safety	The term process is more dedicated to operational aspects	X			

75.	FRA014	1.13	the ~~process~~ methodology by which the criticality safety assessment should be carried out.	The term process is more dedicated to operational aspects	X			
76.	PAK001	1.13	It also provides an introduction to the management system that should be in place, ~~safety criteria~~ **subcritical limits** and safety margins, and criteria for determining exemptions to certain	i. The safety criteria have been replaced with subcritical limit in the document. However, in our opinion safety criteria is broader term than subcritical limit and should be retained. If it is necessary to replace the term safety criteria with subcritical limits, than same terminology may be used throughout the document as highlighted with bold text.	X			
77.	IND003	1.13/12 -14	**Suggestion**: Consideration may be given for inclusion of exemption limits and parameter/nomograms for different fissile materials in Annex. Further, providing a list of various computational tools and their brief description along with merit/demerits will be useful.	Suggestion to enhance the value of the document.			X	The suggestion goes out of the scope of the document

78.	CAN008	2.01	Technical: Revise language in the following way: These safety measures should be identified, implemented, maintained and periodically reviewed to ensure that operations and activities stay within defined safety limits (see para. 2.9) in ~~operational states~~ normal and credible abnormal conditions.	To make technical content and terminology of the guidance consistent with that used in national and international standards on criticality safety adopted or recognized by the most member states. See comment 2 on para 1.2 for more details.	X			
79.	ENISS3	2.01	These safety measures should be identified, implemented, maintained and periodically reviewed to ensure that operations and activities stay within defined safety limits (see para. 2.9) in operational states and credible abnormal conditions (see para. 2.3).	See also Comments N°4, N°6, N°7	X			
80.	FRA015	2.01	These safety measures should be identified, implemented, maintained and periodically reviewed to ensure that operations and activities stay within defined safety limits (see para.2.9) in operational states normal and credible abnormal conditions.	Same comment as for para 1.2.	X			
81.	FRA016	2.01	i.e. based on actions and controls of operating personnel)	Controls are also part (and are important regarding criticality safety) of operating personnel activities	X			

82.	GER010	2.01	Safety measures, both engineered measures and administrative measures (i.e. based on actions of operating personnel), ensure that facilities are operated and activities are conducted within specified operational limits and conditions that ensure subcriticality. These safety measures should be identified, implemented, maintained and periodically reviewed to ensure that operations and activities stay within defined safety limits (see para. 2.9) in operational states and credible abnormal conditions or conditions included in the design basis.	The criticality safety has to be ensured in conditions included in the design basis as well.		X		See GER008
83.	BE002	2.02	To be added at the end of 2.2: Some other parameters like □eff (delayed neutron fraction) might play a role in the safety assessment, if dynamic effects may occur in particular for fluids in accidental conditions.	Focusing on keff might not be enough in particular in accidental conditions. One should envisage considering □eff, □eff…	X			

84.	BE003	2.02	The effective neutron multiplication factor4 (keff) of a system + definition in the footnote To be added to the footnote: To be complete, one notes that keff, might be defined in a different way, for instance: through the concept of reactivity; as the “main” eigenvalue of a criticality eigenvalue problem; may be a static (time independent) or a dynamic quantity (time dependent)…	There are alternative ways to define the effective neutron multiplication factor which may be more suitable for some systems (as subcritical assemblies and ADS). One notes for instance, the notion of reactivity □, the definition through the mean generation time □, and the mathematical definition as a concept coming from an eigenvalue problem. Note also that keff may be a static (time independent) or a dynamic quantity (time dependent) (see for example 2.25 *Criticality safety staff should be knowledgeable about the physics (both static and kinetic)*” This alternative definitions should be at least mentioned in the footnote or refer to dedicated references for completeness.	X			
85.	BE004	2.02	…which requires nuclear data such as cross-sections and in particular neutron fission cross-sections., ~~capture cross-sections and scattering cross-sections for the materials of the system…~~	There exist many “types” of cross-sections (differential cross-section, total cross-section…) and all of them play an important role in the criticality assessment. We suggest not to enumerate them and to provide a general statement instead or to limit them to the use of “fission cross-sections”.	X			

86.	BE005	2.02	Because of the large number of variables upon which the neutron multiplication factor depends, there are many examples of apparently ‘anomalous’ behaviour in changes seem counterintuitive. Nuclear data should only be used in full calculations of keff as attempts to estimate keff from trends in nuclear data can be misleading. Because the effective neutron multiplication factor depends on many different parameters, a ‘reliable’ assessment of the effective neutron multiplication factor may only be conducted if all these parameters are known with enough accuracy. The assessment of the effective neutron multiplication factor must take into account a proper uncertainty assessment.	This statement is misleading, in particular terms “‘anomalous’ behavior”. A general statement should be envisaged instead. The adjective effective has been omitted also… The correction about ‘effective’ has to be conducted through the whole document.		X		1. term effective neutron multiplication factor corrected 2. A reliable assessment of keff is not necessary to ensure subcriticality. Rather, as is common practice, keff can be largely overestimated via conservative assumptions (e.g., assumption of optimum concentration or spherical geometry, etc.), which accomplishes the goal of assuring subcriticality without accurately knowing the true value of keff. The comment related to proper accounting of uncertainty has been incorporated into the accepted/modified text.

87.	FRA017	2.02	Subcriticality is generally ensured through the control of a limited set of macroscopic parameters such as mass, concentration, moderation, geometry, nuclide composition, density, and neutron reflection, interaction or absorption. The determination of these limits is generally based on the effective neutron multiplication factor4 (keff) of the system, for which nuclear data are required. ~~The effective neutron multiplication factor4 (keff) of a system may be estimated on the basis of these parameters for some systems. However, those parameters are insufficient for an accurate calculation, which requires nuclear data such as neutron fission cross-sections, capture cross-sections and scattering cross-sections for the materials of the system.~~ Because of the large number of variables upon which the neutron multiplication factor depends, there are many examples of apparently 'anomalous' behaviour in which changes seem counterintuitive. ~~Nuclear data should only be used in full calculations of keff as attempts to estimate keff from trends in nuclear data can be misleading.~~	This paragraph is not clear, in particular the link between the macroscopic parameters and the cross sections. Simplification proposed.	X			

88.	FRA018	2.02	Subcriticality is generally ensured through the control of a limited set of macroscopic parameters such as mass, concentration, moderation, geometry, nuclide composition, enrichment, density, and neutron reflection, interaction or absorption. The associated limits of these parameters are mostly calculated through the effective neutron multiplication factor4 (keff) of a system End of §	To be more comprehensible, no need at this part of the guide to go further in details.			X	This comments contradicts comment No FRA017 which was accepted.
89.	GER011	2.02	Subcriticality is generally ensured through the control of a limited set of macroscopic parameters such as mass, concentration, moderation, geometry, nuclide composition, density, and neutron reflection~~, interaction~~ or absorption.	Reflection and absorption are also interactions.			X	Existing text. Interaction here means interaction without absorption.
90.	SWE39	2.02 Subheading	SUBCRITICAL, SAFETY AND OPERATIONAL LIMITS, SAFETY MARGINS	The Guide should make it clear what these terms stand for			X	Some of the terms are defined elsewhere, some are obvious. This SG is not intended to be a textbook, it assumes certain knowledge and understanding of the concept.
91.	UK036	2.02	"behaviour in which changes seem counterintuitive."	Ambiguous. What behaviour and changes in what?		X		This is an existing approved text of the current SSG-27. No alternative proposal is in the comment.

92.	USA010	2.02	**Technical:** Revise language in the following way: “The effective neutron multiplication factor of a system may be estimated on the basis of these parameters for some systems. ~~However, those parameters are insufficient for an accurate calculation, which requires nuclear data such as neutron fission cross-sections, capture cross-sections and scattering cross-sections for the materials of the system~~.”	The statement was deleted because it is inaccurate. The values of parameters absolutely can be used to demonstrate subcriticality without performing an explicit calculation. For example, a system containing less than 500g U-235 does not require an explicit calculation to demonstrate subcriticality because it contains less than a critical mass.		X		The whole paragraph was modified as a combination of several comments. The proposed suggestion for deletion is included.
93.	USA011	2.02	**Editorial:** Revise language in the following way (added text in RED): “Only ~~N~~nuclear data should ~~only~~ be used in full calculations of k_eff as attempts to estimate k_eff from trends in nuclear data can be misleading.”	The current language suggests that nuclear data can only be used for limited situations when performing calculations; whereas, its intent is to state that only nuclear data should be used as other methods can be misleading.		X		The comment is not applicable as the language was modified following other comments.
94.	TUR006	2.02 line 2	Subcriticality is generally ensured through the control of a limited set of macroscopic parameters such as mass, concentration, moderation, geometry, nuclide composition, volume, density, and neutron reflection, interaction or absorption.	Volume should add.			X	The “volume” was removed from the list of parameters in the whole document, the correct parameter is “mass”
95.	GER012	2.02 Line 6	…. ~~Because of the large number of variables upon which the neutron multiplication factor depends, there are many examples of apparently ‘anomalous’ behaviour in which changes seem counterintuitive.”~~ …	We suggest deleting here. This sentence is vague, hard to interpret and does not provide any relevant information. What changes are meant? What is apparently ‘anomalous’ and why?			X	It is an existing text. We believe this is a useful warning and explanation why this topic is so complex.

96.	SWE38	2.02/2	… nuclide composition, isotopic distributions of specific elements,	Isotopic composition is an important control			X	See comment. SWE03
97.	CAN009	2.03	Technical: Revise language in the following way: 2.3 The assurance of subcriticality in accordance with Requirements 38 and 66 of SSR-4 [1] is an essential component of criticality safety. The ~~operational states~~ normal ~~conditions in these requirements, that are referred to~~ as credible abnormal conditions ~~or conditions included in the design basis~~, include initiating events…	1. To make technical content and terminology of the guidance consistent with that used in national and international standards on criticality safety adopted or recognized by the most member states, see comment on para 1.2 for more details. 2. To eliminate unnecessary technical details, which cause confusion with respect to the main technical content of this guidance See comment 2 on para 1.2 for more details.	X			

98.	ENISS4	2.03	The assurance of subcriticality in accordance with Requirements 38 and 66 of SSR-4 [1] is an essential component of criticality safety. The operational states and conditions in these requirements, that are referred to as credible abnormal conditions or conditions included in the design basis, include initiating events with the potential to cause criticality listed in the Appendix to SSR-4 [1]. The determination of what constitutes a credible abnormal condition (outside normal operation) should be based on deterministic methods complemented by probabilistic assessment where possible. In the identification of abnormal events, the facility design and the characteristics of the activity as well as operational experience feedback should be considered (see also Ref. [11] and [51]).	See also Comments N°3, N°6, N°7 The SSR-4 does not described explicitly which conditions are referred to as "credible abnormal". The standard ANSI/ANS 8.1-2014 (R2018) details the interpretation of "credible abnormal conditions", in reference with PA (Process analysis) and DCP (Double contingency Principle) and could be a helpful guidance for the user of DS516. Note: Several conditions referred to as credible abnormal conditions are included in the following chapters namely : 3.10, 3.20, 3.33; 4.16, 4.17, 4.38; 5.31, 5.33, 5.36, 5.39, …. "credible abnormal conditions, including human error, internal and external hazards, and loss or failure of structures, systems and components important to safety" in §3.10. "credible long term degeneration and/or degradation of neutron absorbers" in §3.20 "credible abnormal conditions (e.g. deviations from operating	X			

				procedures, credible alterations in process or system conditions” in §3.33 “identify all credible initiating events, i.e. all incidents that could lead to credible abnormal conditions” in §4.16 “credible abnormal conditions in accordance with the double contingency principle or the single failure approach (see paras. 3.5–3.9)” in §4.17 “credible abnormal conditions even in optimum neutron moderation” in §4.38 “a set of credible abnormal conditions in which there is a potential for damage to fuel elements (e.g. leading to a loss of geometry control) or damage to other structures (e.g. leading to a loss of fixed absorbers)” in §5.31 “all credible abnormal conditions. This includes the handling and storage of any degraded fuel (e.g. fuel with failed cladding) that has been stored in canisters. The potential for dispersion of fuel due to degradation of fuel cladding, or due to failures of fuel cladding or fuel assembly structures” in §5.33 “credible abnormal conditions, such as a drop of a fuel assembly, “ in §5.36				

				"credible abnormal conditions involving fuel movements (e.g. a flask being dropped onto the storage array)" in §5.39				
99.	FRA019	2.03	include initiating events ~~with the potential to cause criticality~~ that could lead to criticality conditions	Suggestion for a clearer understanding: not only the accident should be prevented by the conditions where an accident could occur	X			
100.	FRA020	2.03	The assurance of subcriticality in accordance with Requirements 38 and 66 of SSR-4 [1] is an essential component of criticality safety. The ~~operational states~~ normal conditions and conditions in these requirements, that are referred to as credible abnormal conditions ~~or conditions included in the design basis~~, include initiating events…	Same comment as for para 1.2.+ no need to introduce a new kind of "conditions" not used elsewhere in this text: "normal and credible abnormal" is sufficient.	X			

101.	GER013	2.03	The assurance of subcriticality in accordance with Requirements 38 and 66 of SSR-4 [1] is an essential component of criticality safety. The operational states and accident conditions in these requirements, ~~that are referred to as credible abnormal conditions or conditions included in the design basis,~~ include initiating events with the potential to cause criticality listed in the Appendix to SSR-4 [1]. The determination of what constitutes ~~a credible abnormal condition~~ an anticipated operational occurrence or design basis accident (~~outside~~ beyond normal operation) should be based on deterministic methods complemented by probabilistic assessment where possible. In the identification of ~~abnormal events~~ anticipated operational occurrences and design basis accidents, the facility design and the characteristics of the activity as well as operational experience feedback and the frequency of the events should be considered (see also Ref. [11]).	A description of how to determine of what constitutes design basis accidents is missing. Also, the terminology should be aligned with the IAEA Safety Glossary.	X			
102.	UK037	2.03	“complemented by probabilistic assessment where practicable”	Requiring a probabilistic assessment “where possible” is too strong. Adequate fault analysis is possible using purely deterministic methods. This requirement could lead to unnecessarily high costs for criticality assessments for little safety benefit.	X			

103.	FRA021	2.04	~~For high-hazard facilities, the principles of SSG-30 should be used.~~	SSR-4 defines facilities where safety assessment is not necessary and others, where criticality safety shall be ensured by means of preventive measures (…). The notion of high-hazard facilities is defined nowhere. Using the guide for Nuclear Power Plants is not to be considered.	X			
104.	FRA022	2.04	~~For high-hazard facilities, the principles of SSG-30 should be used.~~	SSG-30 is never defined and is for Nuclear Power Plant. In addition, the sentence is not clear: what is a high hazard facilities? Then, applying principles of a document could be ambiguous.	X			
105.	CAN010	2.05	Editorial: A graded approach should be applied to the scope and depth of the criticality safety assessment, the methods and enveloping criticality events within the safety analysis, to the complexity of criticality detection and alarm systems, to the level of training and qualification of criticality safety staff ~~control~~ ~~personnel~~, to emergency preparedness and response, and to administrative criticality control measures. Facility specific attributes that are required to be taken into account in the application of a graded approach are listed in para 6.29 of SSR-4 [1].	Para 2.5 uses the term “criticality control personnel”, there are multiple other related terms used in the document from “criticality safety specialist” to “criticality staff”. Use term “criticality safety staff”, as per para 9.23 of SSR-4.	X			

106.	FRA023	2.05	~~…to the complexity of criticality detection and alarm systems…~~	The part of this sentence is not clear: what is “the complexity”? Please clarify or remove this part of the sentence	X			Replaced with “design of”
107.	UK030	2.05	A graded approach is …	Correction of typographical error	X			
108.	USA006	2.05	A revision to the first sentence is suggested, as follows: “A graded approach is suggested to be used in developing and implementing the approach to ensuring criticality safety of facilities or activities that involve handling of fissile material (see Requirement 11 of SSR-4 [1]).”	Use of the phrase “is suggested” or “is recommended” Using “is required” may be the wrong phrase given that the information is in a guidance document. A graded approach may be used but is not required. For example, worst-case can be considered as a bounding assumption for all accident sequences and failure modes. The referenced Requirement 11 from SSR-4 does not explicitly state that a graded approach is required. Rather, it states that the use of a graded approach shall be commensurate with the potential risk, so this statement is in the SSG-27 is inaccurate.	X			

109.	USA013	2.05	**Technical:** States, "A graded approach is required…" Suggest change "is required" to "may be used"	A graded approach may be used but is not required. For example, worst-case can be considered as a bounding assumption for all accident sequences and failure modes. The referenced Requirement 11 from SSR-4 does not explicitly state that a graded approach is required. Rather, it states that the use of a graded approach shall be commensurate with the potential risk, so this statement is in the SSG-27 is inaccurate.		X		Replaced with "should be used"
110.	BE006	2.06	"~~potential~~ risk"	Pleonastic expression, risk should be simply used instead…			X	"potential risk" is adopted wording from SSR-4, requirement 11
111.	TUR007	2.06 line 4-7	The training programme on criticality safety should include the relevant aspects of nuclear security and accounting for control of nuclear material. Similarly, security staff and staff responsible for accounting for control of nuclear material should receive at least basic training on criticality safety.	Grammar mistake.	X			
112.	FRA024	2.07	Feedback ~~from~~ of operational experience (x2)	To be consistent with the formulation of requirement 73 of SSR-4	X			
113.	FRA025	2.08	Subcritical limits should be derived on the basis of one or both of the following ~~two~~ types of criteria	Suggestion for a clearer understanding	X			

114.	FRA026	2.08	Safety criteria based on the critical value6 of one or more macroscopic control parameters, such as mass, volume, concentration, geometry, moderation, reflection, interaction, nuclide composition and density, ~~and with account taken of neutron production, leakage, scattering and absorption~~	In terms of macroscopic control parameters, for a clearer understanding, there is no need to add neutron physics aspects		X		"macroscopis added", the rest was changed following other comments
115.	SWE40	2.08	2.8. Consideration should be given to bias and uncertainty in the calculation of keff and/or other control parameters before applying the results. The relationship between keff and other parameters may be significantly non-linear.	Moved and modified from 2.9. This applies to all calculations used for safety. Bias is important.		X		The para was modified in combination with other comments as well.
116.	BE008	2.08, 2.9	Sentence from 2.8 continues in 2.9	editorial	X			
117.	BE009	2.08, 2.9	2.9 Alternatively, consideration should be given to uncertainty in the calculation of other control parameters when applying safety margins to their corresponding critical values.	editorial	X			

118.	BE007	2.08, 3.15, 3.16	Subcriticality implies a value of keff of less than one and/or of a control parameter whose value 2.9 corresponds to a keff of less than one. "in all possible situations" (especially accidental conditions). 3.15 The subcriticality of a system should be demonstrated by calculating keff and/or should be controlled by limiting one or more parameters "in all possible situations" (especially accidental conditions). 3.16 The control parameter limitations set out above can be evaluated either by multiplying the critical parameter value determined for all the system's ~~particular~~ conditions (especially accidental conditions) by a safety factor, or by calculating the value of the parameter that ~~is~~ guarantees subcritical.	As indicated in 1.3 and 2.2, assessment of criticality depends on many parameters. It is therefore difficult to relate a value of keff to a single control parameter The use of 'or…' implies that it must be demonstrated that the control parameter is restrictive enough not to lead to criticality in all possible situations. "in all possible situations" must be added. 2.9, 3.15 and 3.16 must be consistent. Expression underlined in 3.16 must be revised.			X	We agree that keff must be less than 1 in all possible situations, however this is not the right place to state this. This fact is clearly stated at several other places, this provision instead gived an "implicit" definition of ensuring subcriticality. The comment is appropriate when discussing process analysis/assurance of subcriticality, but is not appropriate when defining what "subcriticality" is. Furthermore, the comment asserts that a single criticality safety parameter cannot be used to assure subcritical. This is incorrect as it is perfectly acceptable to control a single parameter to assure subcriticality. In fact, this is the very idea behind the concept of "single parameter limits," which is the

								value of a single parameter (with all other parameters optimized) to control subcriticality. A simple example is limiting U-235 below 500grams. This example is controlling mass only, but is acceptable and effective at ensuring subcriticality.
119.	TUR008	2.08/ Line 5	… geometry, **neutron** moderation, **neutron** reflection, **neutron** interaction, nuclide composition…	Similar reason as Comment No:2	X			
120.	UK038	2.08/2.9		Paragraph break in the wrong place (middle of a sentence).	X			It looks like that in track changes mode only.

121.	IND005	2.08/7-9	[Current text]: Safety margins should be applied to determine the safety limits. Subcriticality implies a value of *k*eff of less than one and/or of a control parameter whose value [Proposed Text]: Safety margins should be applied to determine the safety limits. Subcriticality implies a value of *k*eff of less than one and/or of a control parameter whose value 'below' its critical value. In this context, 'below' is used in the sense that the control parameter remains on the safe side of the critical value.	Sentence incomplete and inconclusive.		X		The text was revised following also other comments.
122.	BE010	2.09	This should include for example, the possibility of any calculation method for bias, ~~and~~ bias uncertainty, and sensitivity analyses ~~the sensitivity with respect to changes in the control parameter or keff with values of the other parameters.~~	This statement should be revised.		X		See the revised text
123.	CAN011	2.09	Editorial/Typo: Remove the number 2.9 (identifier of the para) from the middle of the sentence. Correct subsequent numbering.	It appears that para 2.9 identifier is in the middle of the sentence.	X			

124.	FIN003	2.09	/1SSR-4 requires use of conservative margins for <u>design</u> ~~safety~~	SSR-4 states (6.21): The <u>design</u> of nuclear fuel cycle facility:… … b) Shall use conservative margins… Paragraph 6.56. uses wording "conservative design criteria" and "reasonable margin"	X			
125.	FRA027	2.09	Consideration should be given to uncertainty in the calculation of keff when applying safety margins to keff , with considerations to the conservatism of the calculation models assumptions	Calculation model assumptions are, in most cases, very conservative ; that can give also important margins that could be taken into account.		X		The comment is not applicable any more as this part of the sentenced has been replaced following other comments.
126.	FRA028	2.09	*Move this back to 2.8.*	Wording mistake	X			It looks like a mistake only in track changes view mode.

127.	GER014	2.09	Safety margins should be applied to determine the safety limits. <u>Acceptance criteria should be defined, and it should be demonstrated that those acceptance criteria are not exceeded. The upper bound of the uncertainty and sensitivity analysis of k_{eff}-calculations should not exceed those acceptance criteria.</u> Subcriticality implies a value of k_{eff} of less than one and/or of a control parameter whose value corresponds to a k_{eff} of less than one. SSR-4 requires use of conservative margins for safety (see Requirement 17 and paragraphs 6.21, 6.56 and 6.57). Consideration should be given to uncertainty in the calculation of k_{eff} when applying safety margins to k_{eff}. Alternatively, consideration should be given to uncertainty in the calculation of other control parameters when applying safety margins to their critical values. This should include the possibility of any calculation method bias, and bias uncertainty, and the sensitivity with respect to changes in the control parameter or k_{eff} with values of the other parameters. The relationship between k_{eff} and other parameters may be significantly non-linear.	Determining safety limits, i.e. the criteria that ensure subcriticality, with a fixed desired margin (i.e. establishing acceptance criteria) should not be mixed with uncertainties in the calculation of k_{eff}. The upper bound of the uncertainties in the results of k_{eff}-calculations that is considered as to be covered should not exceed the safety limit value.	X			

128.	SWE41	2.09	2.9 Subcritical limits apply to the method for subcriticality determination, safety limits should add safety margins while operational limits include safety limits and may add other margins (SSR-4 [1] Requirement 57 para. 9.27). Subcritical limits should be derived on the basis of one or both of the following two types of data: — the subcritical value of k_{eff} for the system under analysis; a set of one or more control parameters whose values, individually or in combination, for the system under analysis correspond to a k_{eff} of less than one. Examples of such control parameters are mass, volume, concentration, geometry, moderation, reflection, interaction, nuclide composition and density, isotopic fractions for specific elements and with account taken of neutron production, leakage, scattering and absorption.	Subcritical limits relate to physics/methods, their biases and uncertainties together with an arbitrary margin to specify subcriticality, not to safety criteria. The subcritical limit could thus be either a set of control parameter values representative if the system under analysis that gives a specific subcritical keff or the specifications of one or more control parameter values that result in subcriticality alone or in combination. There is often more than one control parameter, e.g. moderation control with mass or geometry as a backup.		X		The introductory sentence not adopted, overlaps with SSR-4.
129.	TUR009	2.09	~~2.9~~	There should be no new para. In this line, it is used in the middle of a sentence. Also the numbering of rest para.s should be corrected.	X			
130.	BE011	2.10	The operational limits and conditions chosen for the facility or activity should be capable of being monitored and controlled, <u>and if possible should not be derived parameters such as keff.</u>	Why? This statement probably implies that measurement of keff is 'less reliable' which is probably wrong in general.		X		The text was modified following other comments.

131.	CAN012	2.10	Editorial: "The operational limits and conditions chosen for the facility or activity should be ~~capable~~ suitable of being monitored and controlled,	The limits and conditions are just numbers, which cannot be "capable"; they can be suitable, appropriate.	X			
132.	CAN013	2.10	Technical: […] and ~~if possible~~ should not be derived parameters such as k_{eff}	Operational limits should not be derived parameters such as k-eff since it is not a parameter that can be easily calculated and verified during operations.... unless you are in a critical experimental facility where your experiment is meant to be based on calculating/estimating k-eff, but in such a case the experiment is outside of the SSG-27 scope.	X			
133.	CAN014	2.10	Editorial: such as k_{eff} Sufficient a	There should be a period before word "Sufficient".	X			
134.	FRA029	2.10	The operational limits and conditions chosen to be lower or equal to the safety limits for the facility or activity should be capable of being	To be explicit and express that more margins can be taken, not only due to calculation methods	X			
135.	FRA030	2.10	should be capable of being monitored and controlled, and if possible should not be derived parameters such as keff	This sentence is not clear	X			

136.	FRA031	2.10	and ~~if possible~~ should not be derived parameters such as keff	k-eff can't be an operational limit since it is not a parameter that can be easily calculated and verified during operations.... (except for a subcritical experimental facility where your experiment is meant to be based on calculating /estimating k-eff, i.e. unless for §5.99).	X			
137.	FRA032	2.10	"The operational limits and conditions chosen for the facility or activity should be capable of being monitored and controlled~~, and if possible should not be derived parameters such as keff~~."	The second part of the sentence is ambiguous. Up to now, we are not capable to monitor and control a keff out of a core.	X			
138.	GER015	2.10	The operational limits and conditions ~~chosen~~ specified for the facility or activity should be capable of being monitored and controlled, and if possible should not be derived parameters such as k_{eff}.	OLC are not chosen but rather specified in the design stage of a facility, confirmed in the commissioning stage and established before operations commence (compare e.g. Requirement 18 of SSR-4)	X			
139.	RUS003	2.10	The operational limits and conditions chosen for the facility or activity should be capable of being monitored and controlled, and if possible, should not be derived parameters such as keff. Sufficient and…	Misprints/edits		X		
140.	UK039	2.10	"keff. Sufficient"	Missing full stop.	X			
141.	FRA033	2.11	Reverse 2.11 and 2.10	Suggestion for a clearer understanding	X			

142.	FRA034	2.11	The parameters quoted in limits and conditions or restrictions should be expressed in terms that can be readily ~~be~~ understood, such as enrichment, packaging rules and moisture or ~~hydrogen~~ moderator material limit or restriction.	Hydrogen limit is precisely not a term that can readily be understood.	X			
143.	TUR010	2.11 Line 6	These parameters include mass, volume, density, concentration and nuclide composition, as well as the geometry, neutron moderation or reflection of the system, and the neutron absorption characteristics of the fissile material mixture and other system materials, liquid flow rates and temperature.	Volume should add.			X	The "volume" was removed from the list of parameters in the whole document, the correct parameter is "mass"
144.	UK040	2.11,	"Where practicable, design features are required to be put in place to effectively prevent criticality being achieved"	It is not always possible to prevent criticality solely by engineered means. These are obviously better, but this must allow for situations where operational controls are also necessary.		X		This part of the sentence was deleted as redundant to requirement 38 of SSR-4.
145.	SWE44	2.11/2+3	...requires that ~~prevention of~~ subcriticality of the design is to be demonstrated in a subcriticality ~~safety~~ assessment if not …	The subcriticality demonstration involves the design and not operations.	X			

146.	SWE42	2.11/3 (*2) 2.11/4 3.1/4 3.3 at the end 3.10/3 3.17/3 3.17/9 3.19/3+ 23/7 3.24/3 3.25/4+ 26/2 3.30/3 3.32/2 4. Heading 4.1/1 4.2/1 4.3/6 Subhead ing 4.4/1+2 4.5/1 4.5/3 4.6/1 4.6/1+4 4.8/1 4.9/1 4.9(c)/1 4.9(f)/1 4.10/1	subcriticality ~~safety~~ assessment, ~~for criticality safety~~ or subcriticality, subcriticality ~~safety~~ in design, conflicts with maintaining subcriticality relevant to maintaining subcriticality ensuring subcriticality ~~safety~~ in the subcriticality assessment Subcriticality ~~safety~~ assessments ensure subcriticality ~~safety~~ in the subcriticality ~~safety~~ assessment important in~~to~~ maintaining subcriticality in the subcriticality ~~safety~~ assessment SUBCRITICALITY ASSESSMENT Subcriticality ~~safety~~ assessments subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment PERFORMANCE OF A SUBCRITICALITY ASSESSMENT subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment subcriticality ~~safety~~ analysis subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment **subcriticality ~~safety~~ assessment** subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment subcriticality ~~safety~~ assessment	Important: If subcriticality is assessed as being acceptably maintained, it does not necessarily mean that criticality safety is acceptable. The listed texts cover subcriticality only. Long expressions can sometimes be made shorter or be altogether removed without losing clarity. It is sometimes not obvious whether the intention is limited to subcriticality assessment or to a wider criticality safety assessment. Sections 4 appears to be purely subcriticality. Section 5, as well, except for references to guides for various facilities and activities: SSG-5 (enrichment), SSG-6 (fuel fabrication, SSG-7 (MOX), NS-G-2.5 (NPP), NS-G-4.3 (RRs), SSG-15 (Fuel Storage), SSG-42 (reprocessing), SSG-43 (R&D), SSG-26 (transport). They cover criticality safety beyond subcriticality to some degree.			X	The assurance of subcriticality (under all normal and credible abnormal conditions) is part of criticality safety. The terms “subcriticality assurance” and “criticality safety” are not interchangeable. The term “subcriticality safety” is non-sensical. Terms “criticality safety” and “criticality safety assessment” are terms used in SSR-4 and in line with common industry terminology.

		4.11/2,5, 9,10 4.14/2 4.15/1 Subhead ing 4.16/1+(b)/1 4.17/1+ 2+5 4.18/1 4.22/1 4.24/2 5.3/2 5.16/1 5.16(b)/ 1 5.16(e)/ 2,3,6 5.25/2,5. 33/6 5.35/1 5.35/4 5.37/1 5.38/8 5.40/4 5.41/3 5.41/4 5.43/1 5.46/2 5.48/2+ 6+7 5.49/5+ 7 5.56/3*2	subcriticality ~~safety~~ analysis subcriticality ~~safety~~ analysis ~~subcriticality~~ criticality-safety assessment, ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality control ~~criticality safety~~ subcriticality analysis ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality measure ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality measures ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality measures ~~criticality safety~~ subcriticality assessments ~~criticality safety~~ subcriticality assessments ensuring ~~subcriticality~~ criticality-safety ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment	5.3 is exception, should be criticality safety. Criticality safety is retained when any doubt exists. Fresh fuel is not conservative for criticality safety (no FPs) Another exception				

		5.57/1 5.58/3 5.61/1 5.61/2 5.62/2 5.67/2 5.69/6 5.70/6 5.74/1 5.74/2 5.77/1 5.77/4+(d)/1 5.78/2+9 5.82/10 5.85/2 5.91/1 5.94/1+3*2 5.95/4	~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality maintenance ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality maintenance ~~criticality safety~~ subcriticality measures ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality maintenance ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment ~~criticality safety~~ subcriticality assessment					

147.	SWE45	2.11/5	~~reactivity~~ fission chain reaction	Reactivity is not useful here.		X		The whole para was modified following other comments.
148.	SWE46	2.11/6	nuclide composition, isotope fractions of specific elements,	The addition of isotope fraction makes sense here.		X		See the comment SWE03
149.	AUS001	2.12	Please add the following sentence at the end of the paragraph: *Application of the provisions of these paras are explained in TECDOC 1768.*	This TECDOC provides clear explanation of the application of the provisions of these paras related to fissile material		X		Reference added to Annex – List of Relevant literature. TECDOCs should not be referenced in IAEA Safety Standards
150.	FRA035	2.12	A useful starting point is the exception criteria applied to the classification of transport packages containing fissile material in para. 417 (a)(b)(e)	These might help to be clearer from a "facility" and not from a "transportation"point of view.	X			
151.	JPN015	2.12	2.12 … A useful starting point it the exception criteria applied to the classification of transport packaged containing fissile nuclide in para. 222 or fissile material in para. 417 ~~(in conjunction with paras, 423(f) and 424(d))~~ of SSR-6 (Rev.1) [6].	Para. 417 is applicable to all types of package, not only to UN2911 and UN2910 (e.g. to UN2908, UN2915, UN2916, UN2917, …).		X		Modified in combination with other comments.
152.	SWE47	2.12	417 (in conjunction with para. 570~~paras. 423(f) and 424(d)~~) of SSR-6 (Rev. 1) [6].	The consignment limits in para. 570 are needed. Paras 423 and 424 are not relevant.	X			
153.	WNTI04	2.12	2.12 A useful starting point is the exception criteria applied to the classification of transport packages containing fissile material in para. 417 (in conjunction with para~~s~~. ~~423(f) and 424(d)~~ 570) of SSR-6 (Rev. 1) [6].	Para.417 is related to not only paras. 423(f) and 424(d). Para. 570 is closely related to para. 417 and more important for readers.	X			

154.	GER016	2.12 Line 2	…. Exemption criteria, if not specified by the regulatory body, should be developed by the operating organization, reviewed by the management of this organization, and then agreed with the regulatory body~~, as appropriate~~.	Under "Prevention" in Requirement 38 of SSR-4 it is stated: "…it meets exemption criteria specified by, or agreed with, the regulatory body, …"		X		'As appropriate' left to respect different regulatory arrangements
155.	VIE01	2.12/ 15th line of page 10	Exemption criteria should be developed by the operating organization, reviewed by the management of this organization, and then agreed by the regulatory body, as appropriate	Exemption criteria developed by the operating organization must be agreed by the regulatory body but not agreed with the regulatory body	X			
156.	TUR011	2.12/ Line 3	… the management of this organization~~,~~ and then …	Minor correction for the sentence. (oxford comma seems to be unnecessarily used)	X			
157.	IND006	2.12/1	**Suggestion:** It may be useful to include an Annexure on typical exemption values for different fissile materials/ different physical/chemical forms	For value addition.			X	This is out of the scope of the approved DPP.
158.	FRA036	2.13	no specific safety measures are necessary to ensure subcriticality accordance with IAEA Safety Requirements (SSR-4).	Is it in SSR-4 ?	X			
159.	FRA037	2.13	…so far below minimum critical values…	Add "minimum" because you should have very important critical values if you also control other parameters like moderation or geometry.	X			
160.	AUS002	2.15	Please add the following sentence at the end of the paragraph: *IAEA TECDOC 1768 provides explanation on exemption related to fissile material.*	"ditto"		X		Reference added to Annex – List of Relevant literature. TECDOCs should not be referenced in IAEA Safety Standards

161.	TUR012	2.15 Line 2	MANAGEMENT SYSTEM	Beginning of a first sentence or a paragraph should be para number in headline" MANAGEMENT SYSTEM"(as see below comment number 5)	X			
162.	TUR013	2.15 Line 1	2.16 A documented management system that integrates the safety, health, environmental, security, quality, human -and-organizational-factors of the operating organization is required to be in place and implemented with adequate resources, in accordance with Requirement 4 of SSR-4 [1]. As part of the integrated management system early in the ………..	Sentence should be completed.	X			
163.	CAN015	2.16	Editorial: Remove para number from the middle of the sentence	It appears that para 2.16 identifier is in the middle of the sentence.	X			
164.	FRA038	2.16	*Move this back to 2.8.*	Wording mistake	X			It looks like a mistake only in track changes view mode.
165.	UK041	2.17		Extra full stop after "[3]".	X			

166.	IND004	2.2/3-6	[Current text]: The effective neutron multiplication factor[4] (k_{eff}) of a system may be estimated on the basis of values of these parameters for some systems. However, those parameters are insufficient for an accurate calculation, which requires nuclear data such as neutron fission cross- sections, capture cross-sections and scattering cross-sections for the materials of the system. [Proposed Text]: A description of the effective neutron multiplication factor (k_{eff}) of a system on the basis of values of these parameters alone is incomplete, and an accurate calculation would require the use of microscopic parameters such as neutron fission cross-sections, capture cross-sections and scattering cross-sections for the system.	Macroscopic parameter alone is not sufficient to estimate precisely effective neutron multiplication factor (k_{eff}), they can ensure subcriticality of the system with a single parameter control.		X		The text was revised following also other comments.

167.	UK020	2.21	There should be a nominated person who is responsible and accountable for criticality safety, including, as appropriate: developing and documenting all aspects of criticality safety assessment, monitoring the performance of activities and processes, ensuring that all staff are adequately trained, and ensuring the existence of a system for keeping records that ensures control of performance and verification of activities that are important to criticality safety. The record keeping system should provide for the identification, approval, review, filing, retrieval, and disposal of records.	Clearer use of English. The term “as appropriate” has been added because some organizations handle fissile material in small quantities and occasionally.	X			
168.	UK042	2.21		It may not be possible to allocate all of these responsibilities to a single person (lower than Chief Executive!). At EDF, responsibility for operational criticality safety and for criticality safety assessments lies in different divisions of the company.	X			
169.	FIN004	2.23	/1The operating organization is required to ensure that criticality safety assessments and analysis are conducted **and** documented**,** and that criticality safety is periodically reviewed.	SSR-4 Requirement 5 does not state that the criticality safety assessments be periodically reviewed, nor does this make much sense. Instead, it may make sense to periodically review criticality safety of the facility. Too many ‘ands’, consider dividing the sentence.	X			

170.	UK021	2.23	Checks should be carried out by the personnel who performed the safety assessments to confirm that data and implementation are correct. Also audits should be carried out by personnel who are independent of those that performed the safety assessments or conducted the criticality safety activities.	Encourages checking of assessment data and assumptions.	X			
171.	USA002	2.24 line 10	Replace the word 'personnel' with 'personal'.	Wrong word used.	X			
172.	GER017	2.24 Bullet 1	- Determining the required competence of criticality safety staff and providing training, as necessary; …	Clarification	X			
173.	UK022	2.25	The responsibilities, knowledge and training for ensuring criticality safety ("competence") should be clearly specified by the operating organisation. The staff having these responsibilities should be formally appointed by the operating organisation. .	The revised text clarifies expectations.	X			
174.	CAN016	2.28	Technical: Revise language in the following way: …carried out in a safe manner should be identified, provided and maintained. Calculation tools (e.g. computer codes) that are used for criticality safety assessment should be identified, verified and validated.	It is important to have both verification of the computer code installation and validation of the code for the intended application. The verification portion is missing here. It is sort of covered in the next sentence, but it is not clear.	X			

175.	USA012	2.28	**Technical:** Change "…that are used for criticality safety assessment should be identified and validated" to "…identified, verified, and validated."	Verification is also a must.	X			
176.	VIE02	2.28/ 2nd line of page 14	Calculation tools (e.g. computer codes) that are used for criticality safety assessment should be identified. These calculation tools should be verified and validated.	It is similar to safety of NPPs and research reactors that calculation tools used in safety analysis are requested to be verified and validated.	X			

177.	IND007	2.28/ 1-2	Calculation tools (e.g. computer codes) that are used for criticality safety assessment should be identified and validated or benchmarked against established codes.	Validation may not be possible in all the cases. Benchmarking against established codes could be resorted to in such cases to meet the intent.			X	Suggestion: reject. Justification: The text of 4.26 and 4.27 was modified in line with comments No. CAN026, FRA091 and USA016, and provides the guidance for validation in those cases where a limited experimental data is available. Code-to-code validation is NOT acceptable, and is in fact not validation at all as it completely misses the purpose of validation. Both codes, especially if both relying on the same data library, are subject to the same sources of uncertainty. As stated in revised text for previous sections, code-to-code comparison may be used to supplement validation, but does not constitute adequate validation. The practice suggested by the comment would represent a safety concern.

178.	FRA039	2.29	~~As stated in para 9.83 of SSR-4 [1] "The procedures shall specify all the parameters that they are intended to control and the criteria to be fulfilled."~~ The procedures are required to specify that all the parameters …	To be consistent with other formulations of the document that are related to recommendations of SSR ou SSG (see. Formulations in 2.3, 2.4, 2.5, 2.7, 2.13, 2.9, 2.11, 3.45, 5.90). This formulation leaves no "shall" in this guide (even in quotation marks). The same remark applies to 2.29, 5.88, 6.3, 6.7, 6.17, 6.24, 6.28			X	It is a direct quotation used in line with rules for quoting Safety Requirements.
179.	FRA040	2.31	*Move this back to 2.30*	Wording mistake	X			It looks like a mistake only in track changes view mode.
180.	UK006	2.32	Original: If unexpected operational deviations occur, operating personnel should immediately place the system into a known safe condition. Revised: If operational deviations occur which are not foreseen in the criticality safety assessment, operating personnel should immediately consult the criticality safety staff for advice on how to place the system into a known safe condition.	Needs to differentiate between those deviations which are unexpected (unlikely) but foreseen and assessed within the safety case and those which are not foreseen. The criticality staff provide advice on safe operation of the facility, they do not operate it.	X			
181.	FRA041	2.33	This includes the system of accounting for, and control of, nuclear material, for which information security should be coordinated in a manner ensuring that subcriticality is ~~maintained~~ not compromised	This is more in accordance with the requirement 75 of SSR-4	X			
182.	UK031	2.34	These operations are required …	Correction of typographical error		X		

183.	TUR014	2.34/ Line 3&4	~~These audits should also cover measures for emergency preparedness and response. These audits should be carried out regularly, and~~ **The audits should be carried out in a regular basis and they should also cover measured for emergency preparedness and response.** ~~t~~The results **of the audit** should be …	The sentence is more understandable in this way.	X			
184.	FRA042	2.35	Most criticality accidents or near-miss accidents have had multiple causes	To add the near-miss accident for the feed-back	X			
185.	FIN005	2.36	/6The investigation should include an analysis of the operation of the facility or conduct of the activity and of human factors. It should also include a review of the criticality safety assessment and analyses that were previously performed, including the safety measures that were originally established.	Clarity and readability. The previous version contained too many things in one sentence, and to many and-words.	X			

186.	FRA043	2.36	Deviation from operational procedures and unforeseen changes in operations or in operating conditions are required to be reported ~~to the regulatory body~~ and promptly investigated by the operating organization. As required by para 9.34 of SSR-4 (1], the regulatory body shall be notified of deviations from one or more operational limits and conditions.	As proposed, the para is much more stringent than the corresponding requirement of SSR-4 (9.34). It is not required to report to the regulatory body any change/deviation (only changes leading to deviate from a limit/condition). Some deviations/changes may remain at the operating organization level (but are still reported – internally - and investigated). Those deviations (and the result of their investigation) are obviously kept available for the authorities, but not reported/notified.		X		Deletions accepted, new sentence in the end not added, repetition with SSR-4.
187.	UK023	2.36	Deviation from operational procedures and unforeseen changes in operations or in operating conditions are required to be reported to the regulatory body and promptly investigated by the operating organization: see Paras 9.34 and 9.35 of SSR-4 [1].	Paras 9.34 and 9.35 of SSR-4 are worded differently. Suggest using this (the SSR-4) wording for consistency.		X		The text modified in combination with other comments.

188.	UK024	2.36	In line with the Graded Approach to safety, the depth and extent of the investigation should be proportionate to the importance of the event. The investigation may consider factors such as: an analysis of the operation of the facility, conduct of the activity and of human factors, and a review of the criticality safety assessment and analyses that were previously performed, including the safety measures that were originally established.	The depth of the investigation should be proportionate to the importance of the event.		X		First part of the proposal accepted.
189.	GER018	2.37 Line 2	…. to identify relevant implications for safety (Requirement 73 of SSR-4 [1]). The management should identify areas for improvement ….	Clarification of sentence		X		The management system should also…
190.	FRA044	3.01	~~For criticality safety in design, the double contingency principle (which is required by para 6.142 of SSR-4 [1]) should be used to ensure fault tolerance [1].~~ For criticality safety ~~in design~~, it is required by para 6.142 of SSR-4 [1] that the double contingency principe is the prefered approach for the prevention by means of design.	To be consistent with requirements of SSR-4		X		SSR-4 requires the double contingency principle to be “the preferred approach”, so in line with Safety Guide terminology “should statement” is used here.
191.	FRA045	3.01	"For criticality safety ~~in design~~, the double contingency principle (which is required by para 6.142 of SSR-4 [1]) should to be the used to preferred means of ensureing fault tolerance [1]."	Delete the term « in design » because this sentence is not only of the design.	X			

192.	UK044	3.01	"…the double contingency principle … should to be the preferred means of ensuring fault tolerance"	Reinstate previous wording. DCP is not the only satisfactory means of demonstrating fault tolerance. Also this is consistent with para 3.5.		X		Slightly different wording not to paraphrase safety requirements as should statements.
193.	SWE48	3.01/1	for ensuring ~~sub~~criticality safety	Criticality safety by reference to defence in depth.	X			
194.	SWE49	3.01/4	the double contingency principle (which is ~~required~~ preferred	"Shall be" preferred is the same as "is" preferred?	X			
195.	CAN017	3.02	Technical: Remove the text – it is not technically sound. ~~The third level provides robustness against the escalation of unlikely events, such as autocatalytic events where a supercriticality excursion power coefficient is positive and causes a cliff-edge effect. This leads to the requirement that inherent and/or engineered safety features, fail-safe design and procedures be provided to control the consequences of such accidents, see para 2.10 of SSR-4~~ [10]. Additional guidance can be found in para 3.10 of this publication.	A criticality accident is not at the 3rd level. At the 3rd level, it is still a prevention of criticality and control of abnormal conditions that may lead to a criticality accident. The text echoes common misinterpretation, which was added to this version despite clarifications by the criticality safety expert during the consultancy meetings on SSG-27 revision.	X			
196.	EGY003	3.02	The objective of defence in depth is to prevent failures or if prevention fails the defence in depth mitigate the consequence of such failure and it ensures that the failure is detected or compensated for or corrected.	The concept of defence in depth prevent failures or mitigate its consequence		X		The text was modified to include "mitigation"

197.	FRA046	3.02	The third level provides robustness against the escalation of unlikely events, ~~such as autocatalytic events where a supercriticality excursion power coefficient is positive and causes a cliff-edge effect. This leads to the requirement that inherent and/or engineered safety features, fail-safe design and procedures be provided to control the consequences of such accidents, see para 2.10 of SSR-4~~.	The example added to illustrate the 3rd level is wrong for nuclear fuel cycle facilities. A criticality accident is not at the 3rd level. At the 3rd level, it is still a prevention of criticality and control of abnormal conditions that may lead to a criticality accident.		X		The text was deleted following other comments.
198.	PAK002	3.02	The facility or activity should be designed and operated or conducted so that requirements for defence in depth against **normal**, credible abnormal conditions or accidents are found in SSR-4 [1].	The concept of "defence in depth" is normally applied to all operational states. Therefore, bold text may be added. The same is mentioned in SSR-4 as well.		X		The text was modified following other comments.
199.	UK045	3.02		I do not understand the specific example given. Also, this para identifies only one of the defence in depth measures (third level) as leading to the requirement for inherent/engineered safety measures. Surely these are preferred for all levels of DiD?	X			
200.	UK046	3.02	"or, if prevention fails, to ensure that the failure is detected.."	Better English	X			

201.	USA014	3.02	**Technical:** Remove the text – it is not technically sound. ~~The third level provides robustness against the escalation of unlikely events, such as autocatalytic events where a supercriticality excursion power coefficient is positive and causes a cliff-edge effect. This leads to the requirement that inherent and/or engineered safety features, fail-safe design and procedures be provided to control the consequences of such accidents, see para 2.10 of SSR-4~~ [10]. Additional guidance can be found in para 3.10 of this publication.	A criticality accident is not at the 3rd level. At the 3rd level, it is still a prevention of criticality and control of abnormal conditions that may lead to a criticality accident. The text echoes common misinterpretation, which was added to this version despite clarifications by the criticality safety expert during the consultancy meetings on SSG-27 revision.	X			

202.	GER022	3.02 and 3.3	Defence in depth 3.2 The requirements for defence in depth against credible abnormal conditions or accidents are found in SSR-4 [1]. Defence in depth is provided by five independent levels of protection. The third level provides robustness against the escalation of unlikely events, such as autocatalytic events where a supercriticality excursion power coefficient is positive and causes a cliff-edge effect. This leads to the requirement that inherent and/or engineered safety features, fail-safe design and procedures be provided to control the consequences of such accidents, see para 2.10 of SSR-4 [1~~0~~]. Additional guidance can be found in para 3.10 of this publication. 3.3. The objective of defence in depth is to prevent failures, or, if prevention fails, the defence in depth ensures that the failure is detected and compensated for or corrected. This is achieved through the successful application of measures in the other levels with mitigation provided to the extent practicable, as described in para. 6.19 and Requirement 10 *Application of the concept of defence in depth*, SSR-4 [1]. The fourth and fifth levels provide mitigation, which, with account taken to the above requirements, leads to the following considerations for criticality:	The description of paras. 3.2 and 3.3 is not in line with the description of the defence in depth concept provided in SSR-4 paras. 2.10 – 2.12. The section on defence in depth in paras. 3.2 and 3.3 need to be revised in accordance with SSR-4 paras. 2.10 - 2.12 as well as paras. 6.19 – 6.27. Applying the defence in depth (DiD) concept to criticality safety when handling fissile material should not assign DiD level 3 already to the task of “controlling a criticality accident”, but to prevent criticality. “Controlling a criticality event” should be assigned to DiD level 4.	X			

			• Application of the fourth level of defence, which deals with ensuring the confinement function to limit radioactive releases, might not be fully applicable in the context of criticality safety, but it should nevertheless be applied to the extent practicable. Level five requires the consideration of mitigation for the radiological consequences of a criticality accident, to which the requirements for emergency preparedness and response in GSR Part 7 [8] also apply; In some operating nuclear facilities, heavy biological shielding may be credited for protecting people and the environment from hazards including criticality. The assessment should consider all the hazards and where possible, prevention of criticality should still be preferred. The safety criteria used in the assessment should be commensurate with the consequences of criticality, taking other hazards into consideration (for instance, where a requirement for emergency cooling conflicts with criticality safety).					
203.	UK048	3.02 or 3?	Restore Table 1 "Overview…"	I found this very helpful.	X			

204.	GER019	3.02 Line 5	…. This leads to the requirement that inherent and/or engineered safety features, fail-safe design and procedures be provided to control the consequences of such accidents, see para 2.10 of SSR-4 [1~~0~~]. ….	Correction (pay attention, the same mistake repeats often)		X		The text was modified following other comments as well
205.	GER020	3.02 Line 9	… The objective of defence in depth is to prevent failures. ~~, or, if~~ If prevention fails, on the other hand, the defence in depth ensures that…	Clarification of sentence		X		The text was modified following other comments as well
206.	SWE50	3.02/2	abnormal conditions ~~or~~ and accidents	Applies to both	X			
207.	IND008	3.02/2-5	**Suggestion:** It's prudent to give an introduction of all levels of defence in depth before detailing out the specifics of level-3 and 4, which are relevant for this safety guide	For comprehensiveness.			X	The description of all levels of defence in depth are provided in SSR-4.
208.	CZE002	3.03	THE TABLE	The table with defense in depth levels is clear and should be left in the document.	X			
209.	FRA047	3.03	*Move this back to 3.2*	Wording mistake	X			
210.	GER021	3.03	*Previous TABLE 1. OVERVIEW OF LEVELS OF DEFENCE IN DEPTH*	We suggest to leave the Table 1, as it is providing clear and simply overview of the levels of defence in depth and the assigned plant states in accordance with the definitions provided in the IAEA Safety Glossary 2018 edition as well as with the definitions provided in SSR-4.	X			

211.	TUR015	3.03	~~3.3~~	There should be no new para. In this line, it is used in the middle of a sentence. Also the numbering of rest para.s should be corrected.	X			
212.	UK007	3.03	The safety criteria used in the assessment should be commensurate with the consequences of criticality, taking other hazards into consideration (for instance, where a requirement for emergency cooling conflicts with criticality safety).	This should be highlighted much earlier in the document as a fundamental principle of criticality safety assessment.			X	The comment is uncler whether it proposes new text as 3.3 or something else?
213.	UK047	3.03		Para number misplaced	X			
214.	SWE51	3.03 Bullet/ 1-4	Application of the fourth level, which deals with mitigation against the consequences from the loss of control provided by level three. For criticality safety, such control includes shielding from direct fission chain radiation, confinement of radioactive materials (including "fresh" fission products) as well as other safety features such as protection against chemical hazards, preventing extensive damage to the facility, etc.	Para. 2.13 in SSR-4 is clear on that chemical and other non-radioactive hazards may be affected by a criticality accident. Para. 2.13 in SSR-4, under level three, mentions extensive damage to the facility. The explosion in Fukushima Daiichi-4 was for some time believed to be caused by fuel storage criticality.		X		The para was modified following other comments.
215.	SWE52	3.03 Bullet/ 4-5	Level five requires the consideration of mitigation for the ~~radiological~~ consequences of a criticality accident	SSR-4 is generally clear about covering all consequences of a criticality accident even if specific requirements usually focus on the radiological part.	X			
216.	SVK004	3.03 Table 1	Table1: Overview of Levels of Defence in Depth	We propose to keep this table because is very helpful in fast understanding between „defence in depth strategy" and subcriticality safety activities.	X			

217.	RUS004	3.04	[4]A system with a favourable geometry is one whose dimensions, shape and construction materials are such that a criticality event cannot occur even with all other parameters at their worst credible conditions.	The system may contain structural materials contributing to the absorption of neutrons (e.g. boron steel, cadmium, hafnium and gadolinium)			X	The comment is unclear on what is proposed.
218.	SWE54	3.04 Footnote 9	… even with all other parameters "at conditions leading to the worst credible configuration"	It may be too conservative to assume that all parameters are at their worst credible conditions simultaneously.	X			
219.	SWE53	3.04/3	changes in reflection, absorption, and moderation	Neutron absorption is usually a passive safety measure.	X			
220.	CAN018	3.05	The double contingency principle ~~is required to be the preferred means of ensuring~~ should be used to ensure fault tolerance	Change in accordance with the change made in 3.1		X		"is" instead of "should"
221.	FRA048	3.05	The double contingency principle is required to be the preferred approach by means of design ~~means of ensuring fault tolerance by design~~: see para 6.142 of SSR-4 [1].	To be consistent with requirements of SSR-4		X		SSR-4 requires the double contingency principle to be "the preferred approach", so in line with Safety Guide terminology "should statement" is used here. The same as comment No. FRA044

222.	GER023	3.08	The system design is required to follow the fail-safe principle in such a way that ~~and the safety measures should fulfil the single failure criterion, i.e. no single failure or event, such as~~ a component failure ~~a function control failure or a human error (e.g. an instruction not followed),~~ ~~can~~ will not result in a criticality accident: see Requirement 23 of SSR-4 [1]. In addition, a single failure should be postulated to ensure that a component failure, a function control failure or a human error will not lead to a criticality accident by ensuring a degree of redundancy of components or systems in accordance with the required reliability of the systems depending on the assigned level of defence-in-depth.	In this paragraph the fail-safe principle is mixed up with the single failure criterion. The single failure criterion is applied to ensure a certain degree of redundancy whereas the fail-safe principle is a design principle that in case of a failure a controlled or safe state will be reached. With regard to the single failure approach it should be stated that even in case of a single failure during a design basis event, criticality will not be reached.		X		See the revised text
223.	FRA049	3.09	Where this is not possible, it should be ensured that sufficient and appropriate additional safety measures are provided to prevent the initiating event from developing into ~~a~~ criticality accident conditions.	Suggestion for a clearer understanding: not only the accident should be prevented by the conditions where an accident could occur	X			
224.	FRA050	3.09	Where this is not possible, it should be ensured that sufficient and appropriate additional safety measures are provided to prevent the initiating event from developing into a criticality accident, with a high degree of confidence.	To ensure the same level of safety.	X			

225.	GER024	3.10	The safety functions needed for ensuring subcriticality should be determined and the safety measures for fulfilling these functions should be defined. The definition and substantiation of the safety functions should be based on an analysis of all postulated initiating events or combination of ~~aggravating~~ events relevant to criticality safety. Those safety functions should be assigned to the relevant plant states such as anticipated operational occurrences or design basis accidents, ~~arising from credible abnormal conditions~~, including human error, internal and external hazards, and loss or failure of ~~structures,~~ systems and components important to safety	A loss of a structure would be considered as a design extension condition, because structures have to be designed to withstand the design basis loads resulting from impacts from postulated initiating events as well as from internal and external hazards.		X		See the revised text. There are no DECs in criticality safety.
226.	UK043	3.10 p17		This is blank	X			
227.	FIN006	3.11	(d) (ii)/ 2**b**ringing the system into normal	misprint (ringing)?	X			
228.	FRA051	3.11	…to observe preferably the following hierarchy.	The hierarchy of the preventive safety measures seems questionable (between “c)” and “d)”, because by definition, behind “c)” there is also human actions) and the examples are more focus on correctives actions than normal operations. Could you soften this clause?			X	The “automatically initiated shutdown” under c) is without human actions. It is an existing approved text of the SG.
229.	FRA052	3.11	IAEA Safety Standards require the preventive safety measures put in place to observe the following hierarch	Unable to find in which standard this hierarchy is required. Is it possible to indicate the reference of the standard(s)	X			

230.	UK008	3.11 (d) (ii)	'ringing' to 'bringing'	Typographical error	X			
231.	TUR016	3.11 ii/ Line 12	valve in response to an indicator or alarm, **b**ringing the system into normal operational limits	Minor correction for the sentence. (is it bringing instead of ringing?)	X			
232.	IND009	3.12/2-3	If sub-criticality cannot be ensured through these means, further safety measures should be employed, for further reducing the probability of the potential criticality accident and mitigating its consequences to occupational workers, public and the environment.	For better readability.	X			
233.	FRA053	3.13	mitigatory safety measures (e.g. shielding, criticality ~~incident~~ accident detection systems and emergency response) should be employed to the extent practicable		X			
234.	FRA054	3.13	~~Safety measures related to the control of more than one parameter should be preferred over the control of a single parameter, when practicable.~~ Safety measures should preferably be controlled by limiting the parameters that has to be controlled.	Not agreed. We should design and operate with the fewest controls to be safer. The simpler the safety is, the fewer errors we will have.		X		Text modified in combination with other comments.

235.	GER025	3.13 Line 4	… Safety measures related to the control of more than one parameter should be preferred over the control of a single parameter, when practicable….	Current sentence needs some clarification or rewording. Maybe the statement in the draft should be more like: if only one parameter should be used, make sure this single parameter is enough to meet all requirements, or take additional parameters into account. By generalizing the present statement, it could be interpreted like: "the more parameters the better". But: If a set of parameters (even if it's just one) meets all requirements (e.g. double contingency principle, defense in depth, etc.), more parameters would generate additional restrictions, but do they really enhance safety?	X			
236.	CAN019	3.14	Editorial: Remove para number from the middle of the sentence	In Para 3.14, it looks like the paragraph number is right after the word "safety", i.e., in the middle of the sentence. It should be in front of the word "safety".	X			

237.	FRA055	3.14	~~The safety measures put in place should be related to the control of more than one parameter should be preferred over the control of a single parameter, when practicable. Examples of the control parameters are given in para. 3.15.~~ ~~The safety measures put in place should be related to the control of a number of parameters and their combinations. Examples of the control parameters are given in para. 3.15.~~	The suggested sentence is not safer than the previous one. One good parameter should often be safer than two weak parameters. It is to the nuclear criticality safety analysis to decide. Suggestion to come back to the current SSG 27 sentence.	X			
238.	FRA056	3.14	*Move this back to 3.13*	Wording mistake	X			
239.	FRA057	3.15	"The subcriticality of a system is generally demonstrated by calculating keff, and one or more control parameters should be derived."	Clarification proposed.		X		Partially accepted
240.	GER026	3.15	The subcriticality of a system should be demonstrated by calculating k_{eff} and~~/or~~ should be controlled by limiting one or more parameters. The control parameters that should be considered for ensuring subcriticality include the following: …	Controlling of relevant parameters should be requested independent of demonstration calculations for k_{eff}.	X			
241.	UK049	3.15	"calculating keff and/or controlled by"	Poor English. Delete 2nd "should be".		X		See the modified text.
242.	UK009	3.15 (g) and (h)	Add 'and location' or 'geometrical distribution' (as used in para 3.21) to both instances	Crucial part of maintaining control	X			
243.	RUS005	3.15 e 3.16	a Limitation on the nuclide composition in the fissile material present in the system.	See para.1.4	X			
244.	SWE56	3.15(e)	Limitation on the ~~nuclide~~ isotopic compositions of the elements	Here, the intention is isotopes in elements. (c) covers nuclide composition.	X			

245.	SWE55	3.15/1+2	The subcriticality of a system design should be demonstrated by determination of k_{eff} and the subcriticality of the operation should be controlled by limiting one or more parameters.	Both calculation of a design keff and operation controls are required to ensure subcriticality.	X			
246.	FRA058	3.16	The control parameter limitations set out above can be evaluated either by multiplying the critical parameter value determined for the system's particular conditions by a safety factor, or by calculating the value of the parameter that allows the system to be subcritical with a sufficient margin.	What is subcritical is not the value of the parameter, but the system. Moreover, in this case, being subcritical is not satisfactory enough : we need to be subcritical with a sufficient margin (i.e. we need to comply with the defined criterion)	X			
247.	GER027	3.16 Line 3	… In deriving safety margins, consideration should be given to the degree of uncertainty in a system's conditions, the probability and rate of change in those conditions, the uncertainties in calculations, if used, and the consequences of a criticality accident	If the value of the parameter is calculated, the uncertainties of the calculation should be considered.	X			

248.	IND010	3.16/	[Current text]: The control parameter limitations set out above can be evaluated either by multiplying the critical parameter value determined for the system's particular conditions by a safety factor, or by calculating the value of the parameter that is subcritical. [Modified text]: The control parameter limitations set out above can be evaluated either by multiplying the critical parameter value determined for the system's particular conditions by a safety factor, or by calculating the value of the parameter that is subcritical with a safety factor.	Calculation of value of a parameter that is subcritical by certain safety margin to account for uncertainty in evaluation of k_{eff}.	X			
249.	UK010	3.16/ 2.8		Ensure consistency of text	X			
250.	FRA059	3.17	(b) The compound (chemical and physical form) to be used cannot change to become a more reactive compound;	Suggestion to be more explicit	X			
251.	FRA060	3.17	The events in (b) and (c) could occur in specific situations - for example, the precipitation of a U/Pu nitrate solution or modification of pellets diameter	Suggestion to be more explicit	X			
252.	SWE57	3.17/1	the ~~nuclide~~ isotopic compositions of the elements in the fissile material	3.17 "nuclide composition of the fissile material" and 3.17(a) "nuclide composition of the elements". 3.15(e) is also involved. Consistency?			X	Here for "fissile material" "nuclide composition "is correct

253.	BE012	3.18	Consideration should be given to replacement of a moderator/reflector with an alternative substance having lower favorable ~~or no moderating~~ properties with regard to criticality;	What about reflectors?	X			
254.	FRA061	3.18	Hydrogen and carbon contained in materials such as water, oil and, graphite and ~~hydrocarbon plastics~~ polyethylene are common moderators	Polyethylene is more common in criticality safety (even in the rest of the document)	X			
255.	FRA062	3.20	Consideration should be given to monitoring the credible long term degeneration and/or situations that can cause the degradation of neutron absorbers.	Suggestion for a clearer understanding	X			
256.	UK011	3.20 - 3.22		These paras present an incomplete set of factors relevant to neutron absorbers. Direct reference should be made to recognized standards which address these aspects, e.g. ANSI/ANS 8.5, 8.14 and 8.21		X		The proposed standards are listed in Annex. Direct reference is not possible as these are not numbered.
257.	FRA063	3.20 3.21	Consideration should be given to monitoring the credible long term degeneration and/or degradation of neutron absorbers and their associated moderators.	As said earlier in the document, neutron absorbers' efficiency can be highly dependent on their associated moderating material.			X	In principal we agree but we believe the meaning is clear even without this addition.
258.	SWE58	3.20/5	a neutron absorbing feature is accounted for ~~or is necessary~~,	The neutron absorption feature may not be necessary but beneficial (defence in depth). The structural features of the neutron absorber may be accounted for elsewhere.	X			

259.	FRA064	3.21	Changes under normal and abnormal credible conditions in the geometrical distribution of neutron absorbers could include slumping, evaporation or compression.	Suggestion for a clearer understanding	X			
260.	SWE59	3.22/8	the absorber nuclide ~~isotope~~ (e.g. ^{10}B)	Here, the solid, fixed absorber is not the pure boron element.	X			
261.	FRA065	3.24	Neutron interaction between units or equipment containing fissile material should be considered (…) (or in some cases maximum distances, e.g. to limit interstitial moderation between units of or equipment containing fissile material	The term unit is not defined in the document, this addition is suggested for a clearer understanding	X			
262.	SWE60	3.25/2	than ~~those calculated by assuming~~ for	It is not only a calculated effect - it really happens.	X			
263.	SWE61	3.26/2	may affect the neutron multiplication factor ~~reactivity~~	reactivity is rarely calculated in criticality safety and is often misused to represent k_{eff}.	X			
264.	FRA066	3.27	They require surveillance or periodic verification and, as necessary, maintenance. Examples of passive components are geometrically favourable pipes, vessels and structures, solid neutron absorbing materials, and the form of fissile material.	Suggestion for a clearer understanding	X			

265.	GER028	3.27	Passive engineered safety measures use only passive components to ensure subcriticality. Such measures are highly preferred because they provide high reliability, cover a broad range of criticality accident scenarios, and need little operational support to maintain their effectiveness as long as ageing aspects are adequately managed. Human intervention is not necessary. Advantage may be taken of natural forces, such as gravity, rather than relying on electrical, mechanical or hydraulic action. Like active components, passive components are subject to (random) degradation and to human error during installation and maintenance activities. They require surveillance and, as necessary, maintenance. Care has to be taken that boundary conditions, necessary for the effectiveness of the passive measure, will be maintained. Examples of passive components are geometrically favourable pipes, vessels and structures, solid neutron absorbing materials, and the form of fissile material.	Please add the issue about boundary conditions, necessary for the activation of the passive measure.	X			
266.	USA015	3.27	**Technical:** Add the following text (added text in RED): "The reliability of these types of components should consider administrative failure modes."	Para 3.27 discusses the fact that passive components are subject to human error during certain evolutions but does not explicitly state that these should be considered when determining the reliability of the component as it does for active components in Para 3.31.	X			

267.	VIE03	3.30/ 10th line of page 26	Independently redundant or diversified systems and components are required to be considered (Requirement 23 of SSR-4 [1]), which should be sufficient to enhance the reliability of the systems and components and to limit the possibility of common cause failure.	Application of principles of redundancy, diversity and independence is to enhance the reliability of the systems and components while the possibility of common cause failure is only implemented by using diversity principle.	X			
268.	FRA067	3.33	The use of administrative safety measures should be incorporated into the comprehensive criticality safety programme (see para. 2.1), and the use of such measures should include consideration of the following : […] (m) Procedures for firefighting (e.g. the use of hydrogen-free or very low hydrogen content fire extinguishing materials).	In some cases, the hydrogen content of the extinguishing materials is not zero, but low enough to have no impact on criticality safety.	X			
269.	RUS006	3.33 (c) 4.06	The control parameter limitations set out above can be evaluated either by multiplying the critical parameter value determined for the system' s particular conditions by a safety factor, or by calculating the value of the parameter that ensure safety margins to keff.	See para. 2.9			X	It is redundant to mention keff in this case.
270.	FRA068	3.34	criticality safety ~~personnel~~ staff	In accordance with the terminology used in SSR-4	X			
271.	FRA069	3.34	The introduction of a new activity ~~may~~ should be subject to authorization by the regulatory body before it can be initiated.	A “should” seems better than a “may”			X	This depends on a particular regulatory regime and in some cases “should” might be not appropriate.

272.	FRA070	3.35	The operating procedures (which are required by SSR-4, requirement 63 [1]),	To be consistent with the rest of the document where the paragraph or the requirement number is given with	X			
273.	AUS003	3.35/(b) & (e)	Are required to be developed in collaboration with criticality safety staff and be consistent with and should include those controls, limits and measures that are important for ensuring subcriticality;	Operating procedures should be written and owned by the operating organisation. The existing (e) sounds confusing.	X			
274.	CAN020	3.40	Editorial:	Spelling of organization should be consistent (i.e. use organization, not organisation)	X			
275.	FRA071	3.40	For this purpose, the operating organization should provide the following: (a) […] manager with overall responsibility for safety at the highest level of the organiszation;	Form : for homogeneity with other occurrences of the same word	X			
276.	USA003	3.40(c) New item.	"The organizational means for ensuring that the staff for criticality safety themselves are provided with periodic training on operational activities."	Ensure criticality safety staff are cognizant of current operation processes and actions. Enable them to perform their required activities listed in 3.41.		X		The text modified in combination with other comments.
277.	FRA072	3.40.c	The organizational means for ensuring that the staff for criticality safety are provided with periodic training on criticality safety that is suited to the operations they are in charge of.	It can be efficient to focus on some specificities of criticality linked to the operators' everyday operations, and spend less time on generalities.	X			

278.	IND011	3.41/2	[Current text] routine refresher training is appropriately recommended and instigated. [Proposed text] routine refresher training is appropriately recommended and **initiated**	'Initiated' would be more appropriate than 'instigated'.	X			
279.	FRA073	3.42	The staff for criticality safety should be responsible for the following: […] (b) Ensuring the accuracy of the criticality safety assessment, by, whenever possible, directly observing the activity, controls, processes or equipment, as appropriate	In some cases, controls are delegated to different operators or supervisors (for instance, an officer in charge of mass accounting who has to check changes made by an operator in a mass accounting software…). The proper completion of these checks may also be observed by the criticality safety staff. But maybe the notion of "controls" is already included in that of "processes" ?		X		Yes the terms activity and controls cover practically all of it.
280.	SWE62	3.42(d)/1	~~criticality~~ operational limits and conditions	SSR-4 refers to operational limits and conditions (they include safety limits)	X			
281.	SWE63	3.42(e)/1	criticality safety-controlled areas	Criticality control for reactors	X			
282.	AUS005	3.43 (c)	Please add the following sentence at the end of para 3.43 (c) *Empowering staff to stop if there is any potential for unsafe conditions*.	Staff responsibilities in para 3.44 (c) states: 'to stop work….' Staff need empowerment to stop working.		X		Added to 2.22. 3.43 contains responsibilities.

283.	AUS006	3.43 bis (e)	Please include a sub-para (e) under 3.43: bis (e) *ensuring that production does not override safety.*	This is to ensure that production pressure does not take over safety and operators do not work under pressure. Production over safety may lead to unintended safety events.		X		Sentence added: "including giving the priority to safety before production"
284.	AUS004	3.43 bis(b)	Please include the following sentence after 3.43 (b) *the inspection, testing and maintenance of engineered safety systems*	Since the 'Supervisor' is responsible for ensuring day to day operation, and therefore, appropriate inspection, testing and maintenance of the safety systems is essential for safe operation.	X			
285.	CAN021	3.44 b)	Editorial: (b) To ~~espouse~~ adopt and contribute to a questioning attitude and strong safety culture; and	Suggest using the word "adopt" instead of "espouse"	X			
286.	SVK005	4.01	The criticality safety assessment and criticality safety analysis should be carried out by suitably qualified and experienced staff for criticality safety who are knowledgeable in all relevant aspects of criticality safety and are familiar with the facility or activity concerned, and should also include input from operating personnel	We propose to keep this paragraph in order to preserve expertise in nuclear facilities unless this text is placed elsewhere in this document		X		Yes, this provision is in para 2.26 of the document.

287.	SWE64	4.01/1	on what SSR-4 refers to as a “deterministic” method ~~approach~~	See alternative text in proposed new Section 2. It is not a deterministic approach and there is not much deterministic about the method (subjective). Paras 4.1 to 4.3 appear to be misleading. The probability, conservative or realistic, should be estimated. The probabilistic method is deterministic in producing a risk value. The deterministic method is qualitative.			X	See GSR Part 4, requirement 15 - approaches
288.	SWE65	4.02/2-4	The probabilistic approach is based on input data that may be realistic or conservative.	See above			X	See GSR Part 4
289.	SWE66	4.02/4	The probabilistic approach ~~provides~~ requires	See above	X			
290.	WNTI05	4.04	4.4 A criticality safety assessment should be carried out during the design, prior to and during construction, commissioning and operation of a facility or activity, and also prior to on-site transport[10], and prior to and during storage of fissile material and post-operational clean-out and decommissioning of the facility.	Off-site transport including prior to transport is covered by SSR-6 and SSG-26.	X			
291.	WNTI06	4.04	[10] Specific requirements for criticality safety during the off-site transport of radioactive material are established in SSR-6 (Rev. 1) [6].	On-site transport is out of scope of SSR-6 as stated in para.107(b) of SSR-6.	X			

292.	FRA074	4.04, 4.5, 4.6, 4.7, 4.8, 4.9	" (…) required (…)"	The requirements references are not very explicit: the terms are not the same in SSR-4 or sometimes GSR part 4. Could explicit the reference where the requirements come from.	X			
293.	SWE67	4.05/2	safety ~~has been~~can be reasonably achieved	Paperwork can determine the past (e.g. no accident) but cannot determine the future.	X			
294.	SWE68	4.05/4	compliance of the design and procedures with appropriate safety criteria …	Compliance of operations cannot be demonstrated.	X			
295.	CAN022	4.06	Technical: Revise language in the following way 4.6 The criticality safety assessment is required to include a criticality safety analysis, which evaluates subcriticality for ~~all operational states, i.e.~~ normal and credible abnormal conditions.	To make technical content and terminology of the guidance consistent with that used in national and international standards on criticality safety adopted or recognized by the most member states. See comment 2 on para 1.2 for more details.	X			
296.	FRA075	4.06	4.6 The criticality safety assessment is required to include a criticality safety analysis, which evaluates subcriticality for ~~all operational states, i.e.~~ normal and credible abnormal conditions.	Same comment as for para 1.2. (Moreover, this sentence was inconsistent with others by associating "operational states" to "normal operations + credible abnormal conditions" while other sentences were "operational states and credible abnormal conditions")	X			

297.	FRA076	4.06	The criticality safety analysis should be used to identify hazards, both internal and external, and to determine the radiological consequences of a criticality accident.	Missing end of sentence.	X			
298.	SWE69	4.06/5	determine the ~~radiological~~ consequences the residual safety margins	There are no radiological consequences in a subcriticality assessment.		X		The meaning was specified by adding "…of a criticality accident". Then the radiological consequences give sense.
299.	FIN007	4.07	All margins adopted in setting subcritical limits (see paras 2.8-2.12) ~~are required to~~ should be justified and documented.	SSR-4 (6.56) uses term "reasonable margin" which is more appropriately combined with the term "should". After all, the administrative margin is arbitrary by definition and it cannot be justified and is not well combined with requirement.	X			
300.	SWE70	4.07/1	setting ~~subcritical~~ operational limits	Operational limits include safety limits (SSR-4).			X	"subcritical limits' are introduced and defined in the guide, so using the term is appropriate. It does not contradict general operational limits as described in SSR-4

301.	FIN008	4.08	In the criticality safety assessment, consideration ~~is required~~ should be given to the possibility of inappropriate (and unexpected) responses by operating personnel to abnormal conditions. The potential for operating personnel to respond to leaks of fissile solutions by catching the material in geometrically unfavourable equipment should be considered, for example.	Please change Is required to should or make a quotation from requirements.	X			
302.	GER029	4.08	In the criticality safety assessment, consideration is required to be given….	Correction of grammar		X		…should be given to…
303.	CAN023	4.09	Editorial: The systematic approach to the criticality safety assessment required to be adopted	It should be "required to be adopted"	X			

304.	FIN009	4.09	/(e)Verification of and validation of the calculation methods including the computer codes and nuclear data. Documentation of the procedures for using them.	Please check the first sentence of the paragraph and clarify (The systematic approach to the criticality safety assessment required t**o** be adopted is outlined …). It is important to document the procedures to allow review of the assessment. The validation and verification of the procedure can not be a requirement, setting up the analysis may be user and model-dependent. The acceptability of the analysis depends on the use of validated codes, input and output and not necessarily on the procedure of generating them.	X			
305.	FRA077	4.09	"The systematic approach to the criticality safety assessment required be adopted is outlined below ..."	This sentence is not clear. Could you clarify it.	X			
306.	FRA078	4.09	Definition of the ~~fissile material~~ reference fissile medium, its constituents, chemical and physical forms, nuclear and chemical properties, (b) Definition of the processes and operations involving the fissile material reference fissile medium;	The term reference fissile medium (or fissile reference medium) is the term used in SSR-4 6.1.4.4 (or 6.1.5.6) To be consistent with the standard SSR-4, this term is more appropriate	X			
307.	UK025	4.09	"… required to be adopted …"	Typographical error – missing "be"		X		…should be…

308.	UK050	4.09	Replace 1st sentence with: A systematic approach to the criticality safety assessment is required, for example as outlined by the following steps:	Sentence is poor, meaning unclear. Any clear systematic approach should be acceptable, so the given outline should not be mandatory.	X			
309.	UK026	4.09(d)	Demonstration of sub-criticality for normal operation and credible abnormal conditions, including application of the double contingency principle arguments and defence in depth (as appropriate), the identification of which criticality parameters are being controlled, and their associated limits.	Include defence in depth	X			
310.	SWE71	4.09(d)/ 1	Demonstration of subcriticality for the design and procedures under normal operation	Subcriticality cannot be demonstrated by paperwork for actual conditions	X			
311.	SWE72	4.09(f)/ 1-2	calculation method and selected options ~~nuclear data~~.	Nuclear data are part of the method.			X	Yes we agree, however we believe it is useful to underline that this includes nuclear data.
312.	IND012	4.09/9-10	(e) Verification and validation/**benchmarking** of the calculation methods including the computer codes, nuclear data and procedures for using them;	Validation may not be possible in all the cases. Benchmarking against established codes could be resorted to in such cases to meet the intent.			X	The same justification as for comment IND007.

313.	CAN024	4.10	Editorial: During development of the criticality safety assessment, the staff performing the assessment should personally observe all relevant aspects of the process or activity being assessed, including any relevant equipment, activities, and processes if possible	Suggest adding "if possible" at the end. The first thought when reading this is how can someone "personally observe" a new process or activity that hasn't been built or set up. Could also change "personally observe" to "personally be involved in" or similar type wording.	X			
314.	UK027	4.10	Where practicable, during development of the criticality safety assessment, the staff performing the assessment should personally observe all relevant aspects of the process or activity being assessed, including any relevant equipment, activities, and processes.	"Where practicable" added because this is not always possible – eg for new design or modifications.	X			
315.	UK051	4.10	Include the words "where practicable" at the start of sentence, ie "Where practicable, during the development ..."	It may not be possible to personally observe the process or activity, either because there is no access to the facility or during the design phase (i.e. when the facility is not yet built).	X			
316.	EGY004	4.11	Before the start of commissioning and operation , or before an existing operation is changed	The following two item are required in commissioning and operation.	X			
317.	UK028	4.11	Before the start of a new operation, or before an existing operation is changed , and where these are significant in terms of criticality safety,	This should apply to changes having criticality safety significance" – not to every new operation or modification.		X		…before an existing operation is changed with potential impact on criticality safety.

318.	UK029	4.11	The reviewer should be competent in criticality assessment (ie knowledgeable about the physics of criticality and familiar with the associated practices, as well as the operations and activities concerned see para. 2.2.6).	Clearer definition of requirement.		X		See the modified text
319.	USA004	4.11	Add the following sentence to the end of the first paragraph: “Verify that all credible abnormal conditions have been identified.”	If the reviewer only verifies the abnormal conditions that the originator identified, then it will be an inadequate review with a higher potential that credible abnormal conditions were missed.	X			
320.	GER030	4.11 Line 4	… The review should include, at a minimum, the validation of the calculation method….	Clarification of sentence	X			

321.	IND013	4.11/4-7	[Current text] Before the start of an operation, or before an existing operation is changed: - An independent review should be performed that confirms the adequacy of the criticality safety assessment. The reviewer should be familiar with the physics of criticality and associated practices, as well as the operation or activity concerned. The review should include at a minimum validation of the calculation method, the methodology for performing the criticality safety assessment, and the demonstration of subcriticality under normal operation and all identified credible abnormal conditions. [Proposed text] Before the start of an operation, or before an existing operation is changed: An independent review should be performed that confirms the adequacy of the criticality safety assessment. The reviewer should be familiar with the physics of criticality and associated practices, as well as the operation or activity concerned. The review should include as a minimum, validation / benchmarking of the calculation method, the methodology for performing	Validation may not be possible in all the cases. Benchmarking against established codes could be resorted to in such cases to meet the intent.			X	The same as previous comment.

			the criticality safety assessment, and the demonstration of subcriticality under normal operation and all identified credible abnormal conditions.					
322.	SWE73	4.11/6	demonstration of subcriticality for the design and procedures under normal operation	Subcriticality cannot be demonstrated by paperwork for actual conditions	X			
323.	CAN025	4.12	Technical: The characteristics of the fissile material (*e.g.* ~~mass, volume,~~ moderation and nuclide composition, including physical form (oxide, nitrate), enrichment, absorber depletion, degree of nuclide decay or in-growth ~~and interaction~~ and irradiation (transmutation of fissile material, results of radioactive decay)	Some of the examples listed are not characteristics of the fissile material (mass, volume and interaction), and some are now included in the new term "nuclide composition" (enrichment, irradiation, decay…) with one important missing (physical form).	X			
324.	EGY005	4.12	The characteristic of fissile material(e.g. mass , volume , moderation , nuclide composition , burnup state , enrichment ,……..)	Burn up state is required to evaluate fissile material for irradiated fuel		X		Burnup is covered by the 'nuclide composition'
325.	FRA079	4.12	The characteristics of the fissile material (*e.g.* ~~mass, volume,~~ moderation and nuclide composition, including physical form (oxide, nitrate), enrichment, absorber depletion, degree of nuclide decay or in-growth ~~and interaction~~ and irradiation (transmutation of fissile material, results of radioactive decay)	Some of the examples listed are not characteristics of the fissile material (mass, volume and interaction), and some are now included in the new term "nuclide composition" (enrichment, irradiation, decay…) with one important missing (physical form).	X			

326.	FRA080	4.12	**Determination of the ~~fissile material~~ reference fissile medium** 4.12 The characteristics of the fissile material reference fissile medium (e.g. mass, volume, moderation, nuclide composition, enrichment, absorber depletion, degree of nuclide decay or in-growth and interaction, irradiation (transmutation of fissile material, results of radioactive decay) is required to be determined, justified and documented. Estimates of the normal range of these characteristics, including conservative	The term reference fissile medium (or fissile reference medium) is the term used in SSR-4 6.1.4.4 (or 6.1.5.6) To be consistent with the standard SSR-4, this term is more appropriate (same remark applies to 4.13, 4.19)	X			
327.	RUS007	4.12	Control of access to criticality controlled areas.	misprint	X			
328.	RUS008	4.12	Point at end of paragraph is omitted	misprint	X			
329.	UK052	4.12	“are required to be determined,”	Plural form (correct English).	X			
330.	SWE74	4.12/1, 3,4	The fissile material characteristics that are essential for subcriticality assessment are required to be determined, justified, and documented. Characteristics include mass, volume, moderation, nuclide composition, isotopic composition, absorber depletion, degree of nuclide decay and in-growth, irradiation (transmutation of fissile material and fission products).	The long sentence with double parentheses (one missing) is split and clarified.	X			
331.	CZE003	4.12/2	enrichment	In this paragraph the characteristics of the fissile material contains enrichment but in the paragraph 1.3/2 the enrichment was removed. Please unify.	X			

332.	UK053	4.16	Replace 3rd sentence with: "Additionally, justification is required for identified initiating events that were excluded from the assessment:"	Better wording.	X			
333.	EGY006	4.16 (b)	Input into the criticality safety assessments should be obtained from safety analysis report , manuals , ……		X			
334.	FRA081	4.17 & others	The criticality safety assessment is required to be performed by using a verified and validated method.	To be accurate, 'methodology' is the science of methods.	X			
335.	SWE75	4.17/3	demonstrates that subcriticality ~~will~~ can be	Paperwork cannot demonstrate future operation safety.	X			
336.	EGY007	4.18 (e)	Operating experience of the facility				X	OLCs should refer to published documents. If operating experience is relevant then it is covered by c) and d)
337.	WNTI07	4.19	The calculation methods, computer codes and nuclear data used should be specified (including their release versions), together with any cross-section pre-processing codes that were used by assessors.	Various preprocessing codes may be used to prepare established cross-section libraries. This should identify codes additionally used by assessors (users).	X			
338.	SWE76	4.19/2	methods (computer codes and nuclear cross-section data) should be specified together with essential specifications (e.g. release versions and cross-section pre-processing codes).	The codes and data define the method, they are not separate.			X	Yes, we agree, however we deem it useful to enumerate all elements.

339.	WNTI08	4.20	The overall safety assessment for the facility or activity should also be reviewed and used to identify and provide information on initiating events that should be considered as credible initiators of criticality accidents; for example, activation of sprinklers, rupture of a glovebox, buildup of material in ventilation filters, collapse of a rack, movement of fissile material ~~during package transport~~ and natural phenomena.	Editorial "package transport" is not clear. "during package transport" is not necessary because it is included in "movement of fissile material".	X			
340.	FRA082	4.21		Delete this sentence, or at least move it. It is linked to the validation and it is not in the correct chapter.	X			
341.	FRA083	4.21	The results of the calculations should be cross-checked by using independent nuclear data libraries or different computer codes when available.	Precision		X		4.21 deleted as suggested in FRA082
342.	FRA084	4.21	In addition, the uncertainties of the calculated results due to the uncertainties of the nuclear data used ~~should~~ *may* be determined.	Currently, it is not the industrial practice. It is not systematic, it depends on fissile materials.		X		4.21 deleted as suggested in FRA082

343.	FRA085	4.21	4.21 The results of the calculations should be cross-checked by using independent nuclear data or different computer codes when available. In addition, the uncertainties of the calculated results due to the uncertainties of the nuclear data used should be determined. These uncertainties are required to be taken into account if the calculated results are compared to the established upper subcritical limits (see para. 38 4.33).	No agreement with this section. Determination of uncertainties in calculation results due to uncertainties on nuclear data can't be done each time. This is more R&D in criticality safety than real important work that can improve safety in facilities. Validation recommended in section 4.25 is sufficient. This section should be removed.		X		4.21 deleted as suggested in FRA082
344.	SWE77	4.21	Delete the paragraph. Move first sentence after para. 4.36	Not an appropriate location. Accounting for bias and uncertainties should be covered earlier in the guide.	X			
345.	UK054	4.21	Replace 4.2.1 with: 4.21 In addition, the uncertainties of the calculated results due to all uncertainties in data (eg uncertainties in nuclear data, dimensions and materials) should be determined. These uncertainties are required to be taken into account if the calculated results are compared to the established upper subcritical limits (see para. 4.33). 4.22 The results of the calculations should be cross-checked by using independent nuclear data or different computer codes when available.	The determination and application of **all** sources of uncertainty is a fundamental requirement. The use of a second calculation for cross-checking is desirable but not always absolutely essential. These two requirements should be separated into 2 clauses.		X		

346.	WNTI09	4.21	These uncertainties are required to be taken into account if the calculated results are compared to the established ~~upper~~ lower subcritical limits (see para.4.33).	Lower limits are conservative. For example, a typical lower limit of k-eff is 0.95 taking into uncertainties from the limit of 1.0.		X		The sentence was deleted following other comments and considering it established a “requirement”.
347.	FRA086	4.22	Calculation methods such as computer codes and nuclear data used in the criticality safety analysis to calculate *k*eff are required to be verified and validated to ensure the reliability of their derived values, taking into account the margins of the calculations model assumptions.	The assumptions taken for the calculation models are mostly very conservative. The margins due to them are in most cases more important than the potential impact due to uncertainties of nuclear data or calculation methods. This should be taken into account, in particular to avoid wasting time on uselessstudies from a safety improvement point of view Same remark of 4.23.			X	The proposed addition makes the sentence too complicated and unclear. We believe the original text does not contradict what is suggested. Therefore suggested to keep it as it is.
348.	GER031	4.22 Line 3	This includes ~~to~~ establishing their limits of applicability, code bias and level of uncertainty: see ~~para. 6.145 of SSR-4 [1]~~ Requirement 18 of GSR Part 4 [2].	The requirement for establishing code bias and level of uncertainty is formulated in Requirement 18 of GSR Part 4. Para 6.145 of SSR 4 merely asks for verification and validation of computer codes and also refers to Req. 18 of GSR Part 4.	X			
349.	SWE78	4.24/4	quantification of ~~any calculation or code~~ bias and uncertainties	The bias and the uncertainties of the method are intended, not only code and not a specific calculation.	X			
350.	SWE79	4.24/6	or with evaluated experimental data	It is essential that any bias and the uncertainties of the experimental data have been estimated.	X			

351.	SWE80	4.25/1-2	~~The calculation method should be validated against selected benchmarks that are representative of the system being evaluated.~~	This is the same guidance as in the previous para. 4.24.	X			
352.	SWE81	4.25/2	The relevance of benchmarks, based on evaluated experimental data, for use …	This ties benchmarks to evaluated measurements.	X			
353.	RUS010	4.26	nuclide composition	See para. 1.4	X			
354.	GER032	4.26 (d) new bullet under d)	… - Correlations between neutron multiplication factors due to nuclear data uncertainties …	We suggest to add this item to 4.26 (d). Concerning the suitability of a criticality benchmark experiment w.r.t. an application case, the most appropriate criterion is in fact the correlation due to nuclear data uncertainties between the k_{eff} value of the benchmark experiment and the k_{eff} value of the considered application case. This correlation is commonly denoted as ck and is currently the most widely used criterion to select appropriate criticality benchmark experiments for validation.	X			
355.	RUS009	4.26 (ii) 4.26 (vi)	The characteristics of the fissile material (e.g. mass, volume, moderation, nuclide composition, absorber depletion, degree of nuclide decay or in-growth and interaction, irradiation (transmutation of fissile material, results of radioactive decay) is required to be determined, …	See para. 1.4	X			
356.	SWE82	4.26(a)/1	Benchmarks ~~Experiments that are used for benchmarking~~	Benchmarks based on experiments need checking.	X			

357.	SWE83	4.26(a)/2	complete and ~~accurate~~ well represented by stated biases (typically corrected for in the benchmark results) and uncertainties	Accurate is a subjective term.	X			
358.	SWE84	4.26(b)	to reduce the effect of shared benchmark uncertainties (correlations, leading to systematic effect uncertainties). ~~minimize uncertainty and/or systematic error~~.	The reason for being careful with correlations. Systematic error is a questionable term here. Random effect uncertainties benefit from using dependent sets.	X			
359.	SWE87	4.26(d)(ii)/1	Isotopic compositions ~~proportions~~ for selected elements.	Examples are U, Pu, B	X			
360.	SWE88	4.26(d)(iv)/4-5	In the absence ~~presence~~ of ~~poorly~~ well-absorbing nuclides ~~materials~~, another element such as oxygen in magnesium oxide~~, oxygen~~ can be an effective moderator.	Oxygen scattering is more important to reduce leakage than for moderation. Oxygen alone should not be pointed out.	X			
361.	SWE85	4.26(d)/1-2	Benchmarks should be reviewed to ensure that their neutronic~~, geometric, physical and chemical~~ characteristics encompass those ~~characteristics~~ of the system of fissile material to be evaluated. The essential nuclide properties of the system should be well represented by the same nuclide properties of one or more benchmarks. Neutronic characteristics include global indicators such as EALF (energy corresponding to average lethargy of neutrons causing fission) as well as leakage, absorption and fission fractions.	The neutronic characteristics are needed. They may be obtained for the “wrong” reason. Thus, the induvial nuclide data need to be covered.			X	Other than neutronic characteristics are also important.
362.	SWE86	4.26(d)/3-4	Neutronic characteristics and sensitivities to nuclide data are determined by system specifications that include the following:	The other, engineering-type of data, determine the neutronics.		X		See the modified text.

363.	SWE89	4.26(vii)	Temperatures in the system. ~~The sensitivity of the system to any simplification of geometry, for example elimination of pipes or ducts.~~	Add temperatures (affect the nuclear data). Delete current (vii) about simplifications.	X			
364.	FRA087	4.26.b	Benchmarks should be selected from multiple independent sets in order to minimize uncertainty and/or systematic bias and in order to avoid the need to have accurate correlation coefficients between experiences.		X			
365.	FRA088	4.26.c	Benchmarks used should have relatively small and mastered uncertainties, compared with any arbitrary or administratively imposed safety margin.		X			
366.	FRA089	4.26.ix	Neutron energy spectrum and spectrum index (q4eV, EALF…).			X		
367.	CAN026	4.27	Technical: Replace the last sentence as follows: ~~Comparison of one computer code's result with the result from using another computer code should not be used to validate a calculation method~~. Comparison of one computer code's result with another may be used to supplement the validation of a calculational method; however, this does not constitute adequate validation.	This re-wording is expected to gain a wider support by the member states.	X			

368.	FIN010	4.27	/last sentence Comparison of one computer code's result with the result from using another computer code should not alone be used to validate a calculation method.	Word "alone" added. In some cases it would be highly recommended to complement validation with comparison against other (for example Monte Carlo) codes. The comparison to other codes and libraries can increase the reliability of the validation.		X		The text was modified to better capture the meaning in line with the proposal.
369.	FRA090	4.27	If no benchmark experiments exist that are strictly representative of the system being evaluated… An important aspect of this process is the quality of the nuclear data and uncertainties in the data. In some cases, the bias can be evaluated by the ad hoc uncertainties regarding raw nuclear data and by propagating these uncertainties in terms of delta keff. For this method, raw nuclear data sensitivity and covariance data are needed.			X		The first change accepted. The second seems to complicate the paragraph too much.

370.	FRA091	4.27	Comparison of one computer code's result with *another may be used to supplement the validation of* a calculation method.	Code-to-code comparison can be a mean to contribute to validation. It's for example recognized in French guidance (guide ASN n°28). Such a method, in particular if the code is a reference code (MCNP or TRIPOLI), could be very useful to validate a calculation method or calculation results, to be sure that the limits determined by calculation are safe enough. The following texts in para 4.37 "Optimum neutron moderation should be analysed regardless of whether the system has an actual moderator (for example, for dry storage facilities)" and in para 4.38 "The criticality safety assessment should demonstrate that the system will remain subcritical in normal operation and credible abnormal conditions even in optimum neutron moderation" are not technically accurate and in contradiction with SSR-4 (requirement 38 and para 6.143) and misinterpret provision of para 6.193 (a) of SSR-4		X		The text was modified accepting this comment in combination with other comments, mainly CAN026 and USA016. The second part of the justification is probably included in this comment by mistake. However, 4.37 and 4.38 were deleted anyway following other comments.

371.	RUS011	4.27	Geometric arrangements and compositions of fissile material relative to non-fissile material such as neutron reflectors and including materials contributing to the absorption of neutrons (e.g. cadmium, boron, hafnium and gadolinium are commonly used, but other materials such as iron also act as slow neutron absorbers).	Boron is omitted	X			
372.	USA016	4.27	Technical: replace the last sentence with following text (added text in RED): ~~Comparison of one computer code's result with the result from using another computer code should not be used to validate a calculation method.~~ Comparison of one computer code's result with another may be used to supplement the validation of a calculational method; however, this does not constitute adequate validation.	This re-wording is expected to gain a wider support by the member states.	X			
373.	SWE91	4.27/10	quality of the ~~basic~~ nuclear data and of the benchmarks. ~~uncertainties in the data.~~	Quality is primarily determined by uncertainties.	X			

374.	IND014	4.27/10 -11	[current text] If no benchmark experiments exist that encompass the system being evaluated (as may be the case, for example, for low moderated powders and waste), it may be possible to interpolate or extrapolate from other existing benchmark data to that system, by making use of trends in the bias. In cases where the extension from the benchmark data to the system at hand is large, an additional margin may be necessary to account for validation uncertainties. Sensitivity and uncertainty analysis may be used to assess the applicability of benchmark problems to the system being analysed and to ensure an acceptable safety margin. An important aspect of this process is the quality of the nuclear data and uncertainties in the data. Comparison of one computer code's result with the result from using another computer code should not be used to validate a calculation method. [proposed text] If no benchmark experiments exist that encompass the system being evaluated (as may be the case, for example, for low moderated powders and waste), it may be possible to interpolate or extrapolate from other existing benchmark data to that system, by	Validation of computer codes and calculation methods by inter-comparison is an internationally accepted practice. In this background, the statement in the draft guide questions the credibility of validated computer codes. Hence, it is suggested to drop the last sentence of the current text			X	The same as previous comment.

			making use of trends in the bias. In cases where the extension from the benchmark data to the system at hand is large, an additional margin may be necessary to account for validation uncertainties. Sensitivity and uncertainty analysis may be used to assess the applicability of benchmark problems to the system being analysed and to ensure an acceptable safety margin. An important aspect of this process is the quality of the nuclear data and uncertainties in the data. ~~Comparison of one computer code's result with the result from using another computer code should not be used to validate a calculation method.~~					
375.	SWE92	4.27/10 -11	Carefulness should be applied when using one validated calculation method to validate another calculation method ~~Comparison of one computer code's result with the result from using another computer code should not be used to validate a calculation method~~	This is a controversial issue and should be left open. There is no real conflict in using a validated method within its range of applicability to support validation of another method. Using Monte Carlo techniques to simplify a measurement geometry specification (e.g. 2D cylindric) for a benchmark is accepted in the ICSBEP evaluations. It has been done and will continue to be done.		X		The text of 4.27 was modified in line with comments No. CAN026, FRA091 and USA016, which further clarified the guidance.
376.	SWE90	4.27/7	an ~~additional~~ "extra" margin, "a penalty", may be necessary to account for validation uncertainties.	Additional margin and penalty are used later as different concepts in paras 432 and 433.			X	"additional margin" is clearer then "extra margin"

377.	SWE93	4.28/1-3	~~Modelling of benchmarks performed by organizations other than that which performs the validation should be evaluated to confirm that the models use appropriate calculation methods and analysis techniques for the intended use.~~	This seems like validation against another method, which is discussed in 4.27. This text is not appropriate here. Maybe, if modified, after the moved para. 4.21.	X			
378.	GER033	4.29	The calculation methods, ~~and~~ analysis techniques <u>and nuclear data library</u> used in the validation to analyse benchmarks should be the same as those used to analyse the system or process to which the validation is applied; otherwise justification should be provided for the use of different techniques.	Since the computational keff bias is generally dominated by the nuclear data bias, the validation has to be performed with the same nuclear data library as used for the analysis of the application case.	X			
379.	SWE94	4.30/1-3	Appropriate statistical methods should be used as the primary means of establishing bias and bias uncertainty ~~in the comparison~~ for validation (i.e. comparing ~~the~~ calculation method results to ~~the~~ benchmark results ~~experiments~~)	Simplification and clarification. The benchmark is not an experiment and the available result applies to the benchmark.	X			
380.	SWE43	4.31/1+35/2	**methods in subcriticality analyses** “subcriticality ~~safety~~ analysis	Continued change of criticality safety to subcriticality			X	See the previous comment.
381.	FIN011	4.32	…and the additional margin should be reasonable.	According to the arbitrary nature of the administrative margin. In accordance with SSR-4.	X			
382.	CAN027	4.33	Editorial: Typo on how k-eff is labelled... eff should be subscripted.	Typo	X			

383.	ENISS5	4.33	An upper subcritical limit (i.e. a direct limit on keff) should be established based on the bias and bias uncertainty of the calculation method, the administrative margin, and any related penalties (e.g. penalty for use of the calculation method outside of its area(s) of applicability, consideration of the experimental uncertainty). When comparing the calculated keff values with this upper subcritical limit, the remaining uncertainties of the calculated keff values (e.g. statistical uncertainties in case of Monte Carlo calculations or uncertainties due to the uncertainties of the nuclear data used) are required to be taken into account (see SSR-4 para 6.144).	The consideration of the experimental uncertainty is necessary to refine the evaluation of the bias and bias uncertainty which could be underestimated if the experimental uncertainty is neglected (cf NUREG 6698).	X			
384.	FRA092	4.33	An upper subcritical limit (i.e. a direct limit on keff) should be established based on the bias and bias uncertainty of the calculation method, the administrative margin, and any related penalties (e.g. penalty for use of the calculation method outside of its area(s) of applicability) and regarding the conservatism of the assumptions of the calculation models.	See comments above. It is important to balance with the assumptions, mostly conservative, that are taken in the calculations. For instance, if process involving U at 5%-mass of 235-U, is calculated with 239-Pu: the conservatism of the assumption is very important, and applying more margins could be useless.	X			
385.	EGY008	4.33 fourth line	K_{eff}	Instead of Keff	X			

386.	FRA093	4.33, 1st sentence	An upper subcritical limit (i.e. a direct limit on keff) should be established based on the bias and bias uncertainty of the calculation method, the administrative margin, the features of the system and its impact on the k_{eff} and any related penalties (e.g. penalty for use of the calculation method outside of its area(s) of applicability).	An upper subcritical limit should also be chosen with the variation of the keff as a function of the variation of the main parameters (mass for example). Keff slope will be very important with highly enriched uranium whereas it will be low with low enriched uranium		X		See the modified text.
387.	JPN003	4.33./L 3	When comparing the calculated k~~eff~~$_{eff}$ values with this upper subcritical limit, the remaining uncertainties of the calculated k~~eff~~$_{eff}$ values (e.g. statistical uncertainties in case of Monte Carlo calculations or uncertainties due to the uncertainties of the nuclear data used) are required to be taken into account (see SSR-4 para 6.144).	Subscripts.	X			
388.	SWE95	4.33/1	A~~n upper~~ k_{eff} subcritical limit (sometimes referred to as "upper subcritical limit" or USL ~~i.e. a direct limit on keff~~)	It is a k_{eff} subcritical limit. There many be other subcritical limits for other parameters. "Upper" does not clarify anything when applied to this Guide and is not used in SSR-4.	X			
389.	SWE96	4.33/4-5	this ~~upper~~ subcritical limit, the remaining uncertainties of the calculated k_{eff} values (e.g. statistical uncertainties in case of Monte Carlo calculations ~~or uncertainties due to the uncertainties of the nuclear data used~~)	Uncertainties due to nuclear data uncertainties are caught and accounted for by the validation.	X			

390.	FRA094	4.34	When computer codes are used in the analysis, the type of computing platform, i.e. hardware and software, together with relevant information on the control of code configuration, especially calculation schemes, should be documented.		X			
391.	SWE97	4.34/1-2	computer methods ~~codes~~ and ~~code~~ method configuration,	The software method includes code, nuclear data and more.			X	"computer method" has a different meaning than "computer codes"
392.	FRA095	4.36	Once the calculation method has been verified and validated, it is required to be controlled and documented as part of the overall management system to ensure that a systematic approach is adopted in ~~designing, coding,~~ testing and documenting the calculation method: see para 4.18 of SSR-4 [1].	Designing and coding are out of scope of this guide because they are relevant to software development.	X			
393.	EGY009	4.37	The nuclear safety assessments fundamentally depend on the ratio of neutron-multiplying materials to neutron-moderating materials that are proposed in the models used in the analysis.	Replace and by to give better meaning	X			

394.	UK012	4.37 - 4.38	Combine with para 3.18 or delete altogether	The discussion of moderator is out of place here. An appropriate location would be with the discussion of moderator as a control parameter in para 3.18. The requirement to demonstrate criticality safety for normal and credible abnormal conditions is already established. While understanding of the coincident condition of optimum moderation (beyond ‘credible abnormal conditions’) may be of use in understanding risk this para implies applying a more restrictive safety criterion. If so this needs discussion in Sec 1.	X			
395.	UK034	4.37 & 4.38	Remove paragraphs	These paragraphs are inappropriate and show a misunderstanding of the principles of criticality.	X			

396.	CAN028	4.37 and 4.38	Technical: Delete paras 4.37 and 4.38	Specifically, the following text in para 4.37 “Optimum neutron moderation should be analysed regardless of whether the system has an actual moderator (for example, for dry storage facilities)” and text in para 4.38 “The criticality safety assessment should demonstrate that the system will remain subcritical in normal operation and credible abnormal conditions even in optimum neutron moderation” is not technically accurate because the wording (i) is in contradiction with SSR-4, requirement 38 and para 6.143 and (ii) misinterprets provision of para 6.193 (a) of SSR-4. If moderation is not a credible condition, it does not need to be considered. As we know, a number of facilities rely on exclusion of moderation by having, for instance, a double roof and double walls.	X			

397.	FRA096	4.37 and 4.38	Delete paras 4.37 and 4.38	If moderation is not a credible condition, it does not need to be considered. A lot of process units in fuel assemblies manufacturing facilities rely on limited moderation. Besides, such a moderation control is presented and discussed in many other paragraphs of part 5 of DS516 (e.g. para 5.16, 5.20, 5.70 etc.).	X			

398.	USA017	4.37 and 4.38	**Technical:** Delete Paras 4.37 and 4.38.	These two paragraphs are absolutely false, extremely problematic, and inconsistent with other sections of the SSG. It is imperative that these two paragraphs be deleted. Controlling and/or limiting moderating material is a perfectly acceptable means of ensuring subcriticality. Under no circumstances should it be required to demonstrate subcriticality under optimum moderation for systems where moderation is adequately controlled. The referenced SSR – Safety of *Nuclear Power Plants: Design Requirements SSR-2/1* is not at all applicable to this SSG as this SSG does not cover nuclear reactors. Under this language, it would be virtually impossible for essentially ALL fuel fabrication facilities to operate.	X			
399.	BE013	4.37, 4.38		4.37 and 4.38 provide a different definition of the optimum neutron moderation. Should be clarified.	X			

400.	FRA097	4.37, 4.38 6	4.37 The nuclear safety assessments fundamentally depend on the ratio of neutron-multiplying materials and neutron-moderating materials that are proposed in the models used in the analysis. This ratio, which leads to the maximum neutron multiplication factor, is called optimum neutron moderation. Optimum neutron moderation should be analysed regardless of whether the system has an actual moderator (for example, for dry storage facilities). 4.38 The criticality safety assessment should demonstrate that the system will remain subcritical in normal operation and credible abnormal conditions even in optimum neutron moderation. Water is conventionally proposed as the moderator in this analysis (but it may be required to analyse several moderators depending on specific system characteristics). Optimum neutron moderation is determined as the fractional density (from 0 to 1 kg/cm3) at which the neutron multiplication factor reaches the maximum value in the system. See Safety of Nuclear Power Plants: Design Requirements SSR-2/1.	No agreement with these two sections. The search of the optimum of moderation depends on the criticality control mode. In case of moderation control, concentration control or mass + geometry control, moderation ratio of the fissile medium are limited. This 2 sections must be removed. Not evaluated	X			
401.	SWE98	4.37- 4.38	All should be deleted.	Perhaps something could be mentioned for fuel storage at power plants. Added at end.	X			

402.	SWE99	4.37 New 4.37	The results of the calculations should be cross-checked by using independent nuclear data or different computer codes when available.	Moved from 4.21. Replaces current 4.37	X			
403.	SWE100	4.38 New 4.38	Benchmark modelling performed by organizations other than that which performs the validation should be compared to support that the results are consistent and evaluated when they are not.	Moved from 4.28. Replaces current 4.38	X			
404.	FRA098	4.38	Optimum neutron moderation is determined as the fractional water density (from 0 to 1 g/cm3) at which the neutron multiplication factor reaches the maximum value in the system.	Unit mistake	X			
405.	RUS013	4.38	the fractional density (from 0 to 1 g/cm^3)	misprint	X			
406.	UK055	4.38	Optimum neutron moderation is determined as the combination of fractional density (from 0 to 1 kg/cm3) and (where credible) the physical distribution of the moderator within the system at which the neutron multiplication factor reaches the maximum value in the system.	Inadequate requirement. Optimum moderation may also involve optimization of the distribution of moderator within a system. Presence of water within fissile units such as fuel assemblies, but not between them is known to give higher k-eff than uniform moderator density everywhere.	X			The whole para was deleted.
407.	GER034	4.38 Line 4	… Optimum neutron moderation is determined as the fractional density (e. g. for water from 0 to 1 ~~k~~g/cm3) at which the neutron multiplication factor reaches the maximum value in the system.	If other material than water is considered, the density range to be analysed will be different. The given unit of kg/cm^3 is probably a typo and should read g/cm^3(?)	X			

408.	RUS012	4.38, line 5	Comparison of one computer code's result with the result from using another computer code, as a rule, should not be used to validate a calculation method.	See para. 4.21. There is a lack of experimental data for transplutonium nuclides.		X		The provision was modified in combination with other comments. It is clear that code comparison might be used as a supplement, however does not constitute adequate validation.
409.	CAN029	5.02	Technical: The facilities and activities of the nuclear fuel cycle may be split into two groups: those ~~for which a criticality hazard is not credible and those for which criticality may be credible;~~ where there is a potential for criticality and where there is no potential for criticality" a) ~~Not credible~~, No potential, for example… ~~Credible~~ Potential, for example,	Use of term credible for the purposes of para 5.2 is not technically sound and inconsistent with the content and terminology of SSR-4, paras 6.148, 9.23, 9.85 and of this draft, paras 1.6, 2.3, 5.8, 5.99, 6.42 b), 6.43. Terminology from these paras should be used in para 5.2.	X			
410.	SWE101	5.02(b)/3	(b) … disposal facilities, and transport between those facilities	Public transport is covered.	X			
411.	JPN016	5.02-a)	a) Not credible, …., transport ~~transportation~~ and conversion; and	"Transport" is used in the IAEA documents.	X			
412.	WNTI10	5.02-b)	"transport" should be added	There is no reason that transport is not mentioned in b) according to the ~~next~~ paras. 5.83 to 5.91.	X			

413.	GER035	5.03	Facilities and ~~packages~~ activities in this second group should be designed and operated or carried out in a manner that ensures subcriticality according to the relevant IAEA specific safety requirements.	According to para 5.2 **facilities and activities** are split into two groups. Using the term 'packages' in the general part might be to specific.	X			
414.	SWE102	5.04 Footnote 12	~~Experimental~~ Research and demonstration facilities	"Experimental" suggests critical experiment facilities to a criticality safety specialist.	X			
415.	GER036	5.06	In conversion facilities uranium concentrates are purified and converted to the chemical forms required for the manufacture of nuclear fuel – usually uranium tetrafluoride or uranium hexafluoride — if enrichment is needed.	Add hyphen to clarify sentence	X			
416.	WNTI11	5.06	**~~Conversion and~~ uranium enrichment** (Guidance related to conversion is not necessary to be mentioned in para.5.6 and 5.7.)	"conversion" is listed in the first group (Not credible) in para.5.2 and only 2nd group should be considered on criticality safety according to para.5.3.			X	This is true, however the text under the heading contains explanation for conversion facilities. We believe it is appropriate to keep it in the title.
417.	SWE104	5.07/1	isotopic ~~composition of~~ mass fractions in natural uranium (i.e. ~0.7 ~~wt.~~% ^{235}U),	wt.% is not an acceptable SI unit. Mass fraction is good.	X			
418.	SWE105	5.07/4	~~more reactive material~~ enriched uranium.	"reactive" is not useful	X			
419.	SWE106	5.09/2	below the ~~subcritical~~ operational limit.	Safety limit is covered by this.	X			
420.	SWE107	5.14 Subheading	Fuel fabrication including reconversion from uranium hexafluoride	Reconversion does not appear elsewhere and fits here.		X		Slightly modified, "including" is not used in titles
421.	SWE108	5.14/1	gases, melts, and solids containing ~~and~~	Metal is not needed.	X			

422.	SWE109	5.15/5	~~ratio~~ mass fraction of PuO_2 ~~to~~ in the total amount of actinide oxides ~~(i.e. the PuO2 concentration)~~.	Mass fraction covers ratio and concentration (not a good term). U+Pu are actinides.	X			
423.	SWE110	5.16(b)/ 1	prevent water leakage into fissile material, or fissile material leakage into water,	Water or fissile material	X			
424.	SWE111	5.16(b)/ 2	~~air rather than~~ water should be avoided ~~used~~	Air may be a possibility, but other options are available.	X			
425.	SWE112	5.16(e)/ 3	subcriticality ~~the safety and quality~~	Quality is not relevant?	X			
426.	TUR017	5.25 Line 6-7	It should be verified that the fissile material nuclide composition complies with the criticality limitations of the storage area.	Describe a fuel's enrichment level with this term.	X			
427.	USA005	5.26	For wet and dry storage systems that use fixed solid neutron absorbers, a surveillance programme should be put in place to ensure that the absorbers are installed, and, to monitor their effectiveness and to ensure that they have not become displaced.	Neutron absorbing materials should have a monitoring program even if degradation is not "predicted." The point being to also detect degradation that wasn't predicted.	X			
428.	TUR018	5.29/ Line 2-4	… at nuclear power plants and at research reactors~~, respectively,~~ is provided in IAEA Safety Standards Series Nos NS-G-2.5, Core Management and Fuel Handling for Nuclear Power Plants [25], and in NS-G-4.3, Core Management and Fuel Handling for Research Reactors [26]**, respectively**.	Minor correction for the sentence.	X			
429.	FIN012	5.30	/(d)… and the subcriticality margin is affected by such cooling time.	Word "time " added.	X			

430.	FIN013	5.30	/(g)The most reactive composition and geometry of… …not the most reactive composition…	The word optimum changed to "most reactive" in order to make distinction to optimum moderation that is a standard term in criticality safety.	X			
431.	WNTI12	5.30	Some of the guidance provided for spent fuel (after final removal from the reactor core) may also be applied to any ~~used fuel (~~irradiated fuel handled and stored at the reactor site, also before final irradiation in the reactor core~~)~~.	The differences between spent fuel and used fuel are not common. There is no need to define "used fuel" only in this section.	X			
432.	WNTI13	5.30	Irradiation and associated radioactive decay of the fissile ~~material~~ nuclides during reactor operation affecting criticality safety, such as potential consequences, subcriticality margins and emergency preparedness and response.	Editorial	X			
433.	GER037	5.30 (g)	… - The most reactive ~~optimum~~ composition and geometry of irradiated fuel inside the reactor core is often not the most reactive ~~optimum~~ composition and geometry of fuel in operations outside the reactor core. The radioactive decay after irradiation could lead to a significant increase of the neutron multiplication factor compared to the neutron multiplication factor based on the nuclide composition at the end of the irradiation. …	The term "optimum" needs some clarification; does it mean "most reactive"? This effect can be important in case of long-term storage or disposal and might be worth to be mentioned explicitly.	X			

434.	SWE115	5.30(b)/ 3	cannot be sufficiently or reliable maintained	These methods may be used even when not necessary.	X			
435.	SWE116	5.30(d)/ 1 5.35/1+ 2 5.37/5+ 6+10 5.38/1+ 3	~~pond)~~ pool	"pool" is used in SSR-4 and should be consistently used.	X			
436.	SWE117	5.30(e)/ 1	The overall nuclide compositions, including isotope compositions of specific elements, physical and chemical forms ~~composition~~	Both the nuclide composition (including fission products) and the isotopic compositions have changed (e.g. U and Pu).	X			
437.	SWE118	5.30(g)/ 1-2	The ~~optimum~~ composition and geometry of irradiated fuel and water that results in maximum credible neutron multiplication factor is often not the ~~optimum composition and geometry of fuel~~ same in operations inside the reactor core as in operations outside the reactor core.	Optimum geometry is not credible inside the reactor and rarely outside the reactor, at least for multiple fuel assemblies. It means expansion of the fuel rod lattice.		X		The text was modified in combination with other comments.
438.	FRA099	5.30.d	The rate of change in fuel composition can be significant during this cooling period and the subcriticality margin is affected by such composition change.		X			
439.	SWE113	5.30/2- 4	~~Some of the guidance provided for spent fuel (after final removal from the reactor…~~	Delete sentence if "spent" is replaced with "irradiated"			X	See other comments related to spent vs. irradiated
440.	SWE114	5.30/5* 2	---	No change. Potential consequences, emergency preparedness and response are all mentioned.			X	It is not clear what is suggested by this comment.

441.	CAN030	5.30-5.51; 5.54b, 5.83-5.90	Editorial: Remove: - the addition to 5.30c - 5.30g - 5.30h - 5.32 - the addition to 5.45 - 5.51 - 5.54b - The addition at the end of 5.84 (From “Principally […]”) - the addition to 5.86 - 5.87 Second part of 5.90 (after “[…] transparent assessments of subcriticality”)	The additions to the listed paras are outside of the scope of the proposed revision by amendment. Existed text did not have any issues, which needed to be fixed in view of publication of SSR-4. There is no obvious justification as to why all these additions are necessary. These additions increase the level of detail of these parts compared to others (statement like 5.51 about the effect of burnable absorbers on neutron spectrum energy is much more precise than most of the rest of the document) or are disproportionate (5.54 b is the best example: this item is not an “issue of particular importance” in reprocessing facilities, which is the title of the list).			X	The proposed additions further improve the guidance. Any particular comments to the proposed modifications would be considered.

442.	FRA100	5.30-5.51; 5.54b, 5.83-5.90	Remove: Remove: - the addition to 5.30c - 5.30g - 5.30h - 5.32 - the addition to 5.45 - 5.51 - 5.54b - The addition at the end of 5.84 (From “Principally […]”) - the addition to 5.86 - 5.87 - Second part of 5.90 (after “[…] transparent assessments of subcriticality”)	Most additions to the listed paras are outside of the scope of the proposed revision by amendment. Existed text did not have any issues. There is no obvious justification as to why all these additions are necessary. These additions increase the level of detail of these parts compared to others (statement like 5.51 about the effect of burnable absorbers on neutron spectrum energy is much more precise than most of the rest of the document) or are disproportionate (5.54 b is the best example: this item is not an “issue of particular importance” in reprocessing facilities, which is the title of the list) or are vague (like 5.90).			X	The proposed additions further improve the guidance. Any particular comments to the proposed modifications would be considered.
443.	PAK003	5.31	…and regular testing and/or maintenance of handling equipment. **Further guidance on handling equipments is provided in SSG-15 [27].**	The bold text may be added, as the guidance on fuel handling equipments is missing in this section.	X			
444.	WNTI14	5.31	*Handling ~~accidents~~ events*	Consistency with “Misloading events” in p. 51. “accidents” should be defined (ex. Abnormal conditions) if it is used.	X			
445.	SWE119	5.31/3+6*2 5.40/2+3	fuel ~~elements~~ assemblies	Fuel elements could be rods.	X			

446.	FRA101	5.33	This includes the handling and storage of any degraded fuel (e.g. fuel with failed cladding) that has been stored in canisters. Water retention (even temporary) within these canisters after their removal from water has to be considered.	Such configurations can lead to a significant increase in keff if such canisters can interact with other fuel assemblies		X		"has to" replaced with "should"
447.	SWE120	5.34/1	~~pins or~~ rods	"pins" is not used in SSR-4.	X			
448.	SWE121	5.34/2	moderation ratio ~~of~~ or the presence of burnable absorbers in the fuel assembly ~~element~~	Removal of burnable absorber rods that are accounted for in subcriticality is serious	X			
449.	SWE122	5.34/2	increase its ~~reactivity~~ k_{eff}.	Reactivity is not correct.	X			
450.	TUR019	5.35 – 5.36	Both spent fuel "pools" and "ponds" are used in the Para.s.	One of the terms should be used in the document.	X			
451.	FRA102	5.36	"In existing facilities where ageing of neutron absorbers has already occurred, provision of solid ~~soluble~~ neutron absorbers for certain credible abnormal conditions, such as a drop of a fuel assembly, should be given only limited credit."	The sentence makes more sense for solid neutron absorbers.	X			
452.	SWE123	5.36/1 Subheading	~~fixed~~ solid absorber	The main characteristic is "solid". Fixed is not defined.			X	This term is used in other IAEA Safety Standards. See for example SSG-52.
453.	TUR020	5.37/ Line 3	… volume of ~~fresh~~ water **not containing absorbers** available …	The sentence is more understandable in this way.	X			
454.	UK056	5.38	"neutron absorption"	Typo. Currently "neutron absorbtion".	X			
455.	SWE124	5.39/2-3	involving ~~fuel~~ "heavy equipment" movements (e.g. a "transport" flask being dropped onto the storage "configuration" ~~array~~).	It is not the fuel that determines the damage. Array is more of a calculation term.		X		

456.	GER038	5.40	For ~~fuel~~ nuclear facilities that may handle more than one type of fuel element and/or have storage areas with different requirements for acceptable storage within the same facility, the possibility of misloading of fuel elements into the wrong storage locations should also be considered in the criticality safety assessment.	Clarification	X			
457.	TUR021	5.40/ Line 1	For fuel **cycle** facilities…	Terms should be consistent with IAEA terminology.		X		Just “facilities”
458.	GER039	5.42	Safety measures associated with events of this type should include engineered features to preclude misloading (e.g. based on the physical differences in fuel assembly design); ~~alternatively,~~ additionally, administrative controls and verification	Administrative controls and verification of fuel assembly markings should not be done alternatively but should be foreseen in any case as part of the management system.	X			
459.	SWE127	5.43 2nd bullet/3	Accounting for the burnable absorber is referred to as burnable absorber credit (or gadolinium credit when that absorber is involved).	This is an important term.	X			
460.	SWE125	5.43/1	involving ~~spent~~ fuel that is or could be irradiated, the ~~spent~~ fuel	“Spent” means fully irradiated, no more reactor irradiation while burnup credit applies to all fuel, often potentially fresh fuel. Just “fuel” is ok.	X			

461.	SWE126	5.43/2-3	~~greatest~~ maximum neutron multiplication factor over the whole expected burnup range, including no burnup (sometimes called the "peak reactivity", in particular when burnable absorbers are credited). For many fuel types the maximum ~~peak reactivity~~ is achieved by fresh fuel. For other types there may be a maximum ~~peak in reactivity~~	The maximum (easier to refer to than "greatest" and avoiding the term reactor physics term "peak reactivity") may be at zero burnup, in particular if burnable absorbers are not credited at all.	X			
462.	CAN031	5.44	Editorial	Typo: Second bullet has . ,	X			
463.	EGY010	5.44	….The application of burnup credit is covered in paras 5.47 to 5.50	Instead of 5.43-5.46 as indicated	X			
464.	FIN014	5.44	/10The application of burnup credit is covered in paras. 5.47–5.51.	Seems to reference wrong paragraphs	X			
465.	UK057	5.44	"The application of burnup credit is covered in paras. 5.47–5.51.	Wrong para numbers.	X			
466.	JPN004	5.44./last line	…irradiation. The application of burnup credit is covered in paras. 5.~~43~~47–5.~~46~~51.	Correcting quoted paragraph numbers.	X			

467.	SWE129	5.44/1-11	Accounting for the maximum neutron multiplication factor due to irradiation is a requirement unless: • The fuel which may have a maximum above zero irradiation (burnup) can be demonstrated not to be irradiated, or • It can be sufficiently demonstrated that the fuel has reached a minimum irradiation level (burnup) and that the effects of this burnup can be safely accounted for. This more realistic approach is commonly known as 'burnup credit'. The application of burnup credit is covered in paras. 5.47–5.50. Burnup credit for a minimum burnup for some fuel may be combined with burnable absorber credit for other fuel to allow lower burnup levels.	Where only fresh fuel can be expected and demonstrated, e.g. fresh fuel reception, storage and handling, there is no need to account for irradiation. Burnup credit is a separate, independent option that may be combined with a burnable absorber credit option.	X			
468.	SWE128	5.44/1-4	Accounting for the maximum neutron multiplication factor due to irradiation is a requirement unless: ~~• The burnable absorbers, if present, are not accounted for in the criticality safety assessment, or~~	The maximum is required even if burnable absorbers are not credited. The maximum will be at a different burnup (not necessarily fresh fuel, see 1st bullet in 5.43)	X			
469.	SWE131	5.45 addition on new para.	Taking credit for burnable absorbers in fuel that may be irradiated does not require verification of the burnup but requires verification of fuel designs and initial enrichment.	Burnable absorber credit is not well described in the guide.	X			
470.	SWE130	5.45/7	misloading events, as described in para. ~~5.38~~ 5.40-5.42,	Changed paras.	X			
471.	CAN032	5.47	Editorial	Typo: There is a random f) bullet.	X			
472.	GER040	5.47	*delete extra paragraph f)*	Paragraph is empty	X			

473.	AUS007	5.47 bis (b)	Please include the following advantage of use of burnup credit in criticality safety assessment. This can be inserted after sub-para (b) bis (b) *Increased accuracy in safety analysis by reducing the uncertainties in safety margins*	Use of burnup credit reduce the uncertainties in safety margin and hence improve the accuracy in safety analysis. In addition, because of reduction in uncertainties in safety margins storage and transport capacity is increased as mentioned in 5.47 (c) and 5.7 (d).		X		Burnup credit vs. safety margin uncertainity is covered by 5.48
474.	TUR022	5.47/ Line 11	~~(f)~~	The statement is blank, so it should be cleared	X			
475.	SWE132	5.47/1	~~spent f~~uel during irradiation	spent or irradiated is redundant.	X			
476.	FIN015	5.48	(a) and (b) /(b)Validation of the… …in paras. 4.22 - 4.37. Burnup credit analysis involves irradiated fuel which should be taken into account in the validation. (remove the rest of the para.)	References to paragraphs should be checked, (4.22-4.37) seem slightly odd! The nuclear data uncertainties are not unique to burnup credit analysis. Even in fresh fuel case, the storage geometry may contain many different materials. Here, it is sufficient to point out that the validation should take into account the spent fuel composition.	X			
477.	SWE134	5.48(b)/ 3-4	~~any~~ additional uncertainties	"any" is removed (always) "additional" is added	X			
478.	SWE135	5.48(b)/ 3-4	accumulated burnup ~~history~~ (in which credible fuel history variations are accounted for) for each specific fuel type~~amount of burnup is an important parameter~~)	A loading curve contains fuel enrichment and burnup for a specific fuel type. The fuel history (depletion and cooling) needs to be accounted for.	X			

479.	IND015	5.48/2-4	[current text] The criticality safety assessment and supporting analysis should reliably determine the *k_{eff}* for the system, by taking into account the changes to the fuel composition during irradiation and changes due to radioactive decay after irradiation. Suggestion: It would be a useful addition to have an annexure covering **a** list of important actinides and fission products, that may get generated due to irradiation/decay, which can significantly affect the k_{eff}.	Changes in fuel composition due to irradiation and decay leads to many actinides and fission products. It will be greatly useful to have a list of important actinides and fission product, which can significantly affect k_{eff} in Annexure.			X	The proposal is out of the scope of approved DPP
480.	SWE133	5.48/3	determine a maximum value of the k_{eff} for the system, by taking into account some of the changes	It is not necessary to make an accurate determination. Only some of the changes.	X			
481.	SWE103	5.5/5	~~common~~ typical errors such as ~~double~~ over-batching,	“Common” is a bit strong. Any over-batching may be serious.	X			
482.	FIN016	5.50	**Example of** further information and guidance…	Many guides for burnup credit exist. [28] is from 2011 and just one example. Please add other references.		X		See the text

483.	FIN017	5.51	The presence of burnable absorber (BA) and its effect on the neutron energy spectrum should be taken into account. ~~accounted for separately in the depletion calculations, and not as part of burnup credit.~~	The current formulation is not understood. Yes, BA credit and burnup credit are different approaches. However, BA credit is conceptually very similar with burnup credit and many requirements should be same for these two methods. When it comes to burnup credit, the effect of presence of BA should probably be considered. One possibility is to delete the paragraph since its purpose and meaning is not clear.	X			

484.	GER041	5.51	~~The presence of burnable absorber (BA) and its effect on the neutron energy spectrum should be accounted for separately in the depletion calculations, and not as part of burnup credit.~~	We suggest to delete this paragraph. It is not clear what is meant by "accounting for the presence of burnable absorber and its effect on the neutron energy spectrum separately in the depletion calculations, and not as part of burnup credit." In a burnable absorber credit analysis, the nuclide composition of the spent fuel is commonly calculated in depletion calculations taking into account the burnable absorber in the fuel. The subsequent criticality calculation is then based on the fuel composition corresponding to the peak reactivity. At peak reactivity, however, there is still some burnable absorber left in the fuel. Hence, the presence of burnable absorber is in fact accounted for as part of burnup credit.	X			
485.	SWE136	5.51	~~5.51 The presence of burnable absorber (BA) and its effect on the neutron energy spectrum should be accounted for separately in the depletion calculations, and not as part of burnup credit~~	This is not correct. Depletion is an essential part of burnup credit. Presence of burnable absorbers should be accounted for, conservatively, see 5.48(c)	X			

486.	WNTI15	5.51	The presence of burnable absorber (BA) and its effect on the neutron energy spectrum should be accounted for separately in the depletion calculations~~, and not as part of burnup credit~~.	The BA should be taken into account in the depletion calculations of burnup credit for BWR fuels.	X			
487.	SWE137	5.54(b)/ 1	other actinides than uranium and plutonium	No actinides are referred to in this para. while U, Pu and Th are mentioned in para 5.53.	X			
488.	SWE138	5.54(g) new	(g) Difficulties in monitoring the continuous processes in high radiation level operations.	It may be difficult to see exactly what is going on.	X			
489.	SWE139	5.60/2	affect the subcriticality measures include:	Just criticality is not correct.	X			
490.	GER042	5.69 Line 2	….to detect such leaks are provided in para. ~~5.54~~ 5.59.	Check correctness of reference – para. 5.54 does not deal with leakage detection	X			
491.	EGY011	5.72	… The recommendations in para 5.71-5.79	Instead of 5.58-5.77 according to the new modification	X			
492.	FIN018	5.72		The referencing to paragraphs (in paras 5.58-5.77) should be checked	X			
493.	GER043	5.72 Line 2	…The recommendations in paras ~~5.58 – 5.77~~ (x.xx – y.yy) apply to packaging	Check correctness of reference	X			
494.	JPN005	5.72./L 1	Waste management operations cover a very wide range of facilities, processes and materials. The recommendations in paras 5.~~58~~73–5.77 apply to packaging, …	Correcting quoted paragraph number.	X			

495.	JPN006	5.72./L 3	The recommendations are intended to cover ~~the long term~~ management ~~and disposal~~ of waste arising from operations involving fissile material (e.g. ’legacy waste’)	According to the IAEA Safety Glossary (2018), the definition of waste management includes all administrative and operational activities involved in the handling, pretreatment, treatment, conditioning, transport, storage and disposal of radioactive waste.		X		“waste management”
496.	SWE140	5.72/1	in paras ~~5.58–5.77~~ 5.71-5.79	Paras for waste management	X			
497.	EGY012	5.73	Waste is commonly wrapped in materials that can act as more effective moderators than water — for example, polyethylene and this should be avoided and taken into account in the criticality safety assessment.	Avoid using moderator as wrapped materials			X	Polyethylene might be a good solution for many types of waste, we do not want to close this option totally.
498.	CAN033	5.75	Technical: For the storage of waste containing fissile nuclides, consideration should be given to potential changes in the configuration of the waste, the introduction of a moderator or the removal of material (such as neutron absorbers) as a consequence of a credible internal or external event	To make it consistent with para 6.50 of SSR-4.	X			
499.	JPN017	5.78	5.78 … , resulting in more handling and transport ~~shipments~~ and higher storage volumes, …	Redundant		X		

500.	WNTI16	5.78	5.78 … , resulting in more handling and transport ~~shipments~~ and higher storage volumes, …	Editorial “shipments” is duplicate to “transport”.	X			
501.	GER044	5.78 Line 5	… This might then lead to an increase in the number of packages produced, resulting in more handling, ~~and transport~~ shipments and higher storage volumes, each of which is associated with a degree of risk (e.g. radiation doses to operating personnel, road or rail accidents, construction accidents).	‘transport’ and ‘shipment’ are redundant	X			
502.	TUR023	5.79/ Line 1	The fissile inventory of spent fuel mainly consists of ~~any~~ remaining 233U ~~or/and~~ **and/or** 235U and	Minor correction for the sentence.	X			
503.	FIN019	5.82		The referencing to paragraphs 5.85-5.91 should be checked and corrected. Paragraph 5.85 has nothing to do with research laboratories.	X			
504.	WNTI17	5.82	The approach used to ensure subcriticality in decommissioning may be similar to that used for research laboratory facilities (see paras. 5.~~85~~92–5.~~91~~98),…	Editorial	X			
505.	JPN007	5.82./L 1	The approach used to ensure subcriticality in decommissioning may be similar to that used for research laboratory facilities (see paras. 5.~~85~~92–5.~~91~~98), where …	Correcting quoted paragraph numbers.	X			

506.	JPN008	5.83./L 1	Movement or ~~transfer~~ transport of radioactive material within a licensed site should be considered to be an on-site operation.	Better wording.			X	When describing movement of materials on the site we prefer to call it transfer. Transport is used for between the sites.
507.	TUR024	5.83/ Line 2	to be an on-site ~~operation~~ **transport**.	On-site transport is more suitable than on-site operation.			X	The term "operation" is used intentionally here. Transport is a defined term, however what we have in mind here is really one of operations.
508.	FIN020	5.84	… ~~The general requirement to prevent criticality in transport does not require licensing~~. (to be removed)	It is not clear what is meant by this sentence. Therefore, it is difficult to propose new formulation.	X			
509.	FRA103	5.84	**~~Principally due to the requirement for multilateral approval of package designs intended for transport of fissile material, the criticality safety licensing requirements for transport are more prescriptive ("how to design a subcritical package") rather than safety-based ("what to achieve to obtain criticality safety in actual transport"). The general requirement to prevent criticality in transport does not require licensing.~~**	The proposed additional text is not appropriate in SSG-27. The general framework should be better placed in the SSG-26.	X			

510.	JPN018	5.84	5.84 The licensing requirements for subcriticality assessment for off-site transport differ considerably from the requirements for licensing requirements for subcriticality at facilities and for activities other than transport. ~~The general requirements to protect against the consequences of a criticality accident, preferably by preventing criticality applies both to transport (basis for SSR-6 and as specified in para. 673(a)) and to other operations.~~ …	"General requirements", which appear only in this paragraph throughout this document, are ambiguous words and the intention of using them is not clear. If the words are used, the definition, concept of the words or related examples should be added.	X			
511.	JPN019	5.84	5.84 … ~~Principally due to the requirement for multilateral approval of package designs intended for transport of fissile material, the criticality safety licensing requirements for transport are more prescriptive ("how to design a subcritical package") rather than safety-based ("what to achieve to obtain criticality safety in actual transport").~~ …	This sentence does not help users of the Transport Regulations, but confuses them. In addition, multilateral approval does not seem to be the reason that the requirements are prescriptive (see 5.85).		X		Reduced following other comments.
512.	JPN020	5.84	5.84 … ~~The general requirement to prevent criticality in transport does not require licensing.~~	Intention of this sentence is unclear. See Comment No. 18.	X			

513.	WNTI18	5.84	5.84 The licensing requirements for ~~sub~~criticality assessment for off-site transport differ considerably from the requirements for licensing requirements for subcriticality at facilities and for activities other than transport. ~~The general requirements to protect against the consequences of a criticality accident, preferably by preventing criticality applies both to transport (basis for SSR-6 and as specified in para. 673(a)) and to other operations. Principally due to the requirement for multilateral approval of package designs intended for transport of fissile material, the criticality safety licensing requirements for transport are more prescriptive ("how to design a subcritical package") rather than safety-based ("what to achieve to obtain criticality safety in actual transport"). The general requirement to prevent criticality in transport does not require licensing.~~	"criticality assessment" is used in SSR-6. The term should be consistent in this document. "general requirements" is not clear and it doesn't seem necessary. The requirements for off-site transport in SSR-6 are clear. It's not clear why only multilateral approval is mentioned.	X			
514.	TUR025	5.84/ Line 2&3	from the requirements for licensing requirements for subcriticality at facilities and for activities ~~other than transport~~.	The sentence is more understandable in this way.			X	Deleting "other than transport" would change the meaning of the sentence.

515.	TUR026	5.84/ Line 3-5		It is suggested to rephrase the sentence that starts with "The general requirement… " in order to make the sentence understandable.		X		Replaced with "licensing"
516.	SWE141	5.84/8	general requirement in SSR-6 para. 673(a) to prevent criticality in transport under normal credible abnormal conditions does not require licensing. Subcriticality during transport is controlled by provisions in SSR-6 but does not require licensing.	This is an important para. in SSR-6. An actual transport does not normally require specific licensing.		X		The text modified in combination with other comments.
517.	SWE164	5.84bis	Some credible criticality accident conditions, such as immersion of packages under water (e.g. para. 730 of SSR-6), where the water provides shielding, does not require package design licensing.	Example where demonstration of package design subcriticality is not required for licensing even though criticality may be credible.			X	See comment No. SWE163
518.	WNTI19	5.85	Due to the potential for closer contact with the public and absence of the safety amenities of a facility, the criticality safety assessment for off-site transport is more stringent and is required to be conducted solely on the basis of a deterministic approach.	Only off-site transport is close to the public.	X			
519.	SWE142	5.85/2-3	, and absence of licensing for real transport conditions, the licensing requirements ~~safety assessment~~ for a transport package design ~~is~~ are more stringent. ~~and is required to be conducted solely on the basis of a deterministic approach.~~	The regulations are stringent for package designs, not for real transport.		X		

520.	AUS008	5.86	Please replace the word ‘*sample*’ (transport package) with ‘*prototype*’	Since this terminology is commonly used for testing a new design of a package.	X			
521.	FIN021	5.86		X	Y			

522.	FRA104	5.86	The potential state of a ~~**sample**~~ transport package before, during and after the tests specified in SSR-6 (Rev. 1) [6] (e.g. water spray and immersion, drop and thermal tests) provides confirmation of the assumptions made for the criticality safety assessment and analysis of the design. ~~**The specified tests may not be required if the information can be concluded from reasoned arguments, calculations using validated methods or similar tests in the past.**~~ Since the tests should verify the assumptions used in the subcriticality analysis, many tests need to be considered to cover each scenario (e.g. an individual package and a package in an array configuration). Additional safety assessment (subsequent to competent authority approval) is required for the actual transport operation (see para. 5.82). Although the requirements established in SSR-6 (Rev. 1) [6] provide a prescriptive system for package subcriticality design assessment, they are not free of engineering judgement. Often, especially for estimating the potential behaviour of a ~~**real**~~ package under accident conditions, considerable engineering expertise is required. This also applies to specifications of tests to be carried out and to interpretation of test results for verification of the subcriticality assessment assumptions.	The transport regulations (SSR-6) apply to “*package designs*” and do not refer to “*sample package*” or “*real package*”. So the words “*sample*” and “*real*” should be deleted. The proposed additional sentence beginning with “The specifies tests” should be deleted because it is redundant with SSR-6 and SSG-26. It is not the objective of SSG-27 to repeat SSR-6 and SSG-26. The references of the administrative controls and of the emergency preparedness should be deleted because it is a misunderstanding of para 104 of SSR-6.	X			

			The criticality safety assessment for transport requires understanding of the potential criticality accident consequences of particular transport operations, of the basis and limitations of the package design requirements, **~~of the administrative controls before and during transport as well as of emergency preparedness and response.~~** It should therefore be carried out only by persons with suitable knowledge and experience of the requirements.					
523.	JPN021	5.86	5.86 The potential state of a test specimen of ~~sample~~ transport package before, during and after the tests specified in SSR-6 (Rev. 1) [6] (e.g. water spray and immersion, drop and thermal tests) provides confirmation of the assumptions made for the criticality safety assessment and analysis of the design. …	Better words.		X		Prototype transport package

524.	JPN022	5.86	5.86 … The specified tests may not be required if the information can be concluded from reasoned arguments, calculations using validated methods or similar tests in the past. Since the tests should verify the assumptions used in the subcriticality analysis, many tests need to be considered to cover each scenario (e.g. an individual package and a package in an array configuration). Additional safety assessment ~~(subsequent to competent authority approval)~~ may be ~~is~~ required for the actual transport operation (see para. 5.87~~5.82~~).	Additional safety assessment is not limited to ones subsequent to CA approval. To be consistent to para. 5.87. Correction.		X		CA approval remains
525.	JPN023	5.86	5.86 … Although the requirements established in SSR-6 (Rev. 1) [6] provide a prescriptive system for package subcriticality design assessment, they are not ~~entirely~~ free of engineering judgement. Often, especially for estimating the potential behavior ~~behaviour~~ of a real package under such as loading and unloading ~~accident~~ conditions, considerable engineering expertise is required. This also applies to specifications of tests to be carried out and to interpretation of test results for verification of the subcriticality assessment assumptions. …	Accident conditions are covered in para. 673, but loading/ unloading conditions may not be covered.			X	This is an existing text not subject to amendment.

526.	JPN024	5.86	5.86 … The criticality safety assessment for transport requires understanding of the potential criticality accident consequences of particular transport operations, of the basis and limitations of the package design requirements, of the administrative controls before, ~~and~~ during and after transport as well as of emergency preparedness and response. …	Conditions of after transport should also be included.	X			
527.	JPN025	5.86	5.86 … It should therefore be carried out only by persons with suitable knowledge and experience of the requirements established in SSR-6 (Rev. 1) [6].	The first part of para. 5.87 These words should be moved here.	X			
528.	WNTI20	5.86	The ~~potential~~ state of ~~a~~ test specimen or sample representing a ~~sample~~ transport package before, during and after the tests specified in SSR-6 (Rev. 1) [6] (e.g. water spray and immersion, drop and thermal tests) can provide~~s~~ confirmation of the assumptions made for the criticality ~~safety~~ assessment and analysis of the design.	"potential" is not clear and seems unnecessary. Consistent terminology (criticality assessment)	X			
529.	WNTI21	5.86	5.86 ~~Additional safety assessment (subsequent to competent authority approval) is required for the actual transport operation (see para. 5.82).~~	No additional assessments subsequent to competent authority approval are required in SSR-6 at all.			X	The provisions says that design approval of transport package is not enough for an actual transport. Additional approval/license is needed for individual transports.

530.	WNTI22	5.86	5.86 The criticality safety assessment for on-site transport requires understanding of the potential criticality accident consequences of particular on-site transport operations, of the basis and limitations of the package design requirements, of the administrative controls before and during on-site transport as well as of emergency preparedness and response. It should therefore be carried out only by persons with suitable knowledge and experience of the transport requirements in facilities.	The accident conditions for off-site transport are clearly defined in SSR-6, but the accident scenarios in on-site transport should be considered based on the realistic operations.		X		Agree with the justification for the comment. Namely, SSR-6 assumed very hypothetical and extremely conservative conditions to bound any actual and real life conditions. Realistic conditions of off-site transport are never considered in the assessment. However, the proposed re-wording would put the text out of context of 5.86, which is about off-site, not on-site. Therefore one part of the para deleted, last comment accepted.
531.	GER045	5.86 Line 7	Additional safety assessment (subsequent to competent authority approval) is required for the actual transport operation (see para. 5.88~~82~~).	Para 5.82 deals with subcriticality in decommissioning and not transport.	X			
532.	TUR027	5.86/ Line 11	especially for estimating the potential behaviour of a ~~real~~ package	The sentence is more understandable in this way.	X			
533.	SWE144	5.86/11	~~real~~ package under prescribed accident conditions	A real package should comply with the design. Accident conditions in actual transport should not be confused with those for the package design.		X		Modified following other comments.
534.	SWE145	5.86/12	This ~~also~~ applies to specifications of tests	The tests are used to determine the prescribed normal and accident conditions.			X	These are two different tasks.

535.	SWE143	5.86/7-8	~~Additional safety assessment (subsequent to competent authority approval) is required for the actual transport operation (see para~~	This sentence appears to be redundant, after considering suggested changes above.	X			
536.	CAN034	5.87	Editorial: The paragraph number shows up in the middle of the paragraph (close to the end, before "established in SSR-6"). It should be formatted to show up at the beginning, before "Although the requirements..."	Formatting	X			
537.	FRA105	5.87	"Subcriticality assessment (keff calculation) of a package design is one component of the criticality safety assessment."	What is the difference between « subcriticality assessment » and "criticality safety assessment"? Clarification proposed.	X			
538.	FRA106	5.87	*Move this back to 5.86*	Wording mistake	X			
539.	JPN026	5.87	5.87 ~~established in SSR-6 (Rev. 1) [6].~~ Subcriticality assessment of a package design is one component of the criticality safety assessment. The competent authority may require specific additional actions before, ~~and~~ during and after transport, some of which may require specific approval.	Editorial (see Comment No. 25). Conditions of after transport should also be included.	X			
540.	TUR028	5.87	~~5.87~~	There should be no new para. In this line, it is used in the middle of a sentence. Also the numbering of rest para.s should be corrected.	X			
541.	WNTI23	5.87	5.87 ~~established in SSR-6 (Rev. 1) [6].~~	Typo		X		Looks like a typo in track changes mode only, the final text is good.

542.	WNTI24	5.87	5.87 ~~Subcriticality assessment of a package design is one component of the criticality safety assessment.~~	This sentence doesn't provide any information.	X			
543.	WNTI25	5.87	The competent authority may require specific additional actions before and during on-site transport, some of which may require specific approval.	It is unlikely that the CAs requires any additional requirements beyond SSR-6 for off-site transport, but the CAs may require some requirements for on-site transport depending on the specific operations.		X		Yes we agree, the sentence was deleted not to confuse on-site and off-site transport provisions.
544.	SWE146	5.87/2	… one component of the criticality safety assessment. Emergency preparedness and response are required to be established in advance (SSR-6, para. 304).	Emergency preparedness and response establishment is required but SSR-6 does not specify how.			X	The comment is unclear, what is suggested?
545.	FIN022	5.88		The reference (para 5.81) should be checked and corrected	X			
546.	FRA107	5.88	The para 5.88 could be deleted or could only refer to para 673 od SSR-6. At least, the added words "real" and "actual" should be deleted.	Simplification measure: The para 5.88 is redundant with para 673 of SSR-6. The transport regulations (SSR-6) does not refer to "actual transport" or "real conditions". Those conditions are not the standardized conditions taken into consideration by SSR-6 (normal or accident conditions of transport). SSR-6 applies to "package designs" and not to "real package".	X			

547.	GER046	5.88	The assessment of subcriticality referred to in para. 5.87~~81~~ provides a basis for the package design, but a subcriticality assessment for the actual transport under real conditions is required by Paragraph 673 of SSR-6 (Rev. 1) [6], …	Para 5.81 deals with subcriticality in decommissioning and not transport.	X			
548.	JPN027	5.88	5.88 The assessment of subcriticality referred to in para. 5.86~~5.81~~ provides a ~~safety~~ basis for the package design, but a subcriticality assessment for the actual transport under real conditions is required by Paragraph 673 of SSR-6 (Rev. 1) [6]~~-~~, which states:	Correcting para number. Editingorial (typo).	X			
549.	WNTI26	5.88	The assessment of ~~sub~~criticality referred to in para. ~~5.81~~ 5.86 provides a basis for the package design, but a subcriticality assessment for the actual transport under real conditions is required for on-site transport. Requirements for off-site transport are provided by Para~~graph~~ 673 of SSR-6 (Rev. 1) [6] , which states:	Consistency of terminology. 5.81 is wrong, 5.86 may be more appropriate. SSR-6 doesn't require to consider actual transport conditions including accidents. The transport conditions (routine, normal and accident) for off-site transport are clearly provided in para.673.		X		Slightly modified wording.
550.	WNTI27	5.88 footnote	[18] In the context of SSR-6 (Rev. 1) [6], fissile material includes only ^{233}U, ^{235}U, ^{239}Pu and ^{241}Pu, subject to a number of exceptions identified in para.222.	The intention of this footnote 18 is not clear because it is not related to temperature change. It can be deleted. If it is necessary, para.222 should be added in the footnote because additional conditions are provided in the paragraph.	X			

551.	SWE147	5.88/all	The basis for subcriticality in transport is thus the package design under prescriptive conditions. This is similar to subcriticality for facilities. Actual transport subcriticality requires consideration of realistic normal and credible abnormal conditions. Paragraph 673 of SSR-6 (Rev. 1) [6] states: "Fissile material shall be transported so as to: (a) Maintain subcriticality during routine, normal and accident conditions of transport; in particular, the following contingencies shall be considered:" The contingencies apply to actual transport, not to be confused with the package design requirements, including test specifications.	The transport regulations are not so different to facility regulations. The difference between design safety (paper) and real safety (operation) exists for both. The transport regulations are more prescriptive (not deterministic) for the design and relies on procedures rather than licensing for subcritical operation.		X		The text was modified in combination with other comments.
552.	WNTI28	5.89	Hazards to be considered for on-site ~~transfer~~ transport should include, but are not limited to, the following:	Consistency	X			
553.	GER047	5.89 (a)	a) Insufficient p~~P~~rovisions to ensure that packages of fissile material remain reliably fixed to vehicles	In the way (a) is stated in the draft, it is not a hazard, according of the logic of this paragraph (a) should be reversed or rephrased		X		Hazards changed to Considerations
554.	SWE149	5.89(d)/1	out of the package~~confinement system~~	The confinement system in SSR-6 is a misleading term representing a curious concept. Should not be used here even though it is for on-site transfer.	X			
555.	SWE148	5.89/1	Hazards required to be considered for licensing of on-site transfer	If licensing is not required, there is no difference to public transport.			X	More general term "considerations" is suggested

556.	CAN035	5.90	Technical: Remove para 5.90	Para 5.91 conveys the same meaning as para 5.90 without making strong but vague statements. See comment on para 5.30.	X			
557.	FIN023	5.90	~~Criticality safety in transport requires more than subcriticality~~ -> Criticality safety is a requirement in transport /8…~~That~~ **The** owner of the fissile material should provide any information on special controls required and should justify any actions needed to prevent such potential consequences	The current formulation is not meaningful. What is meant by "Criticality safety requires more than subcriticality"? misprint? Something strange in the sentence.		X		The text was removed

558.	FRA108	5.90	~~**This requirement is different to the package design requirements in SSR-6. Consideration of the actual transport conditions need to be considered, which may differ from the prescriptive design requirements. Actual package contents, actual number of packages, vehicle properties, transport mode environment, human factor consideration, etc. may lead to simpler, more accurate and transparent assessments of subcriticality. Criticality safety in transport requires more than subcriticality and emergency preparedness is required specifically in SSR-6. Any case where the potential criticality accident consequences could be much more serious, than assumed as the basis by SSR-6, should be considered. That owner of the fissile material should provide any information on special controls required and should justify any actions needed to prevent such potential consequences. In general, competent authorities in all countries involved in transport of fissile material should be aware of actual transports and should act on such information where necessary and consistent with national regulations.**~~	The proposed additional para is not appropriate in SSG-27. A SSG document cannot introduce any requirement. It can only explain a SSR document. As written, the text implies that the risk of criticality is poorly taken into account by the SSR-6. If there is a lack in the transport regulations, these transport regulations must be modified. Competent authorities should not replace consignors. This additional para is contradictory to paras 304 and section 5 of SSR-6. The word “owner” is inappropriate and the transport regulations (SSR-6) does not refer to “actual package”.	X			

559.	GER048	5.90	~~This~~ The criticality safety requirement for transport is different to the package design requirements in SSR-6. ~~Consideration of the~~The actual transport conditions need to be considered, which may differ from the prescriptive design requirements. Actual package contents, actual number of packages, vehicle properties, transport mode environment, human factor consideration, etc. may lead to simpler, more accurate and transparent assessments of subcriticality. Criticality safety in transport requires more than subcriticality and emergency preparedness ~~is~~ as required specifically in SSR-6. Any case where the potential criticality accident consequences could be much more serious, than assumed as the basis by SSR-6, should be considered. ~~That~~ The owner of the fissile material should provide any information on special controls required….	Clarification of several issues		X		The paragraph was significantly modified following other ocmments.

560.	JPN028	5.90	5.90 This requirement for on-site transport is different to the package design requirements in SSR-6 (Rev.1) [6]. Consideration of the actual transport conditions need to be considered, which may differ from the prescriptive design requirements. Such as a~~A~~ctual package contents, actual number of packages, vehicle properties, transport mode environment, human factor consideration~~, etc.~~ may lead to simpler, more accurate and transparent assessments of subcriticality. Criticality safety in transport requires more than subcriticality and emergency preparedness is required specifically in SSR-6 (Rev.1) [6]. Any case where the potential criticality accident consequences could be much more serious, than assumed as the basis by SSR-6 (Rev.1) [6], should be considered. That owner of the fissile material should provide any information on special controls required and should justify any actions needed to prevent such potential consequences. In general, competent authorities in all countries involved in transport of fissile material should be aware of actual transports and should act on such information where necessary and consistent with national regulations.	Clarification. Editorial Editorial. Editorial. Editorial.		X		The para was removed from the document following other comments.

561.	TUR029	5.90 Line 1	This requirement is different to the package design requirements in SSR-6[references number].	[References number] should write every citation.	X				
562.	UK058	5.90	“The owner of the fissile material”	Typo. Currently “That owner…”		X			The provision deleted following other comments.
563.	WNTI29	5.90	~~This~~The requirements for on-site transport are ~~is~~ different than~~e~~ the package design requirements in SSR-6. Consideration of the actual on-site transport conditions need to be considered, which may differ from the prescriptive design requirements. Actual package contents, actual number of packages, vehicle properties, transport mode environment, human factor consideration, etc. may lead to simpler, more accurate and transparent assessments of subcriticality for on-site transport. ~~Criticality safety in transport requires more than subcriticality and emergency preparedness is required specifically in SSR-6.~~ Any case where there are potential criticality accident consequences ~~could be much more serious, than assumed as the basis by SSR-6,~~ should be considered.	On-site transport and off-site transport regulated by SSR-6 should be clearly separated. SSR-6 requires only for off-site transport. SSR-6 regulates to prevent any criticality accidents and provides no assumptions on any criticality accidents.		X			The whole para was deleted following other comments.

564.	FRA109	5.91	The criticality safety assessment of a transport package approved according to requirements of SSR-6 (Rev. 1) [6] may rely upon this approval for the use in a facility. In such a case, it should be demonstrated that all normal and credible abnormal conditions are bound by the existing transport package safety assessment **or demonstrated in safety files of facilities**. In addition, the package need to be in the same configuration than during transport (equiped with its shock absorbers for example).	Taking into account current situations.			X	Regardless where the demonstration is, it is still transport package safety assessment.
565.	JPN029	5.91	5.91 The criticality safety assessment of a transport package approved according to requirements of SSR-6 (Rev. 1) [6] may rely upon this approval for the use in a facility. In such a case, it should be demonstrated that all normal and credible off-normal and accident ~~abnormal~~ conditions are bound by the existing transport package safety assessment.	Clarification.			X	The correct terminology is as in the draft.

566.	WNTI30	5.91	The criticality safety assessment of a transport package approved for off-site transport according to requirements of SSR-6 (Rev. 1) [6] may rely upon this approval for the ~~use~~ on-site transport in a facility. In such a case, it should be demonstrated that all normal and credible off-normal and accident ~~abnormal~~ conditions in a facility are bound by the existing transport package safety assessment.	On-site transport and off-site transport regulated by SSR-6 should be clearly separated.		X		1. The comment is technically sound as it relates to the off-site transportation, but it attempts to apply off-site terminology instead of the on-site one. 2. The original text appropriately allows the use of off-site transportation certificate for assessment of any on-site activity, not just on-site transportation.
567.	SWE150	5.91/1	of a transport package, complying with a package design approved …	A specific package is not approved, only the design.	X			
568.	SWE151	5.91/2	package design safety assessment.	Again, it is the design.	X			
569.	CAN036	5.92	Technical: 5.92 This publication also covers those research and development of systems and products laboratories that that handle or utilize fissile material in sufficient quantities ~~for criticality to be credible~~ where there is a potential for criticality	Use of term credible for the purposes of para 5.92 is not technically sound and inconsistent with content and terminology of SSR-4, paras 6.148, 9.23, 9.85 and of this draft, paras 1.6, 2.3, 5.8, 5.99, 6.42b), 6.43. Terminology from these paras should be used in para 5.92.	X			
570.	CAN037	5.92	Editorial: Two "that" words in the first sentence... " that that handle or utilize"	Typo	X			
571.	FIN024	5.92	This publication also covers those research and development laboratories that handle or utilize…	This is a definition that should be stated somewhere in the beginning of the safety guide e.g. in paragraph 1.2.		X		The text was modified to exclude "Scope" type of language

572.	GER049	5.92	This publication also covers those research and development laboratories ~~that~~ that handle or	Remove extra “that”	X			
573.	SWE153	5.92 Footnote 18	In the context of the Transport Regulations, SSR-6 (Rev. 1) [6], the fissile material definition is based on presence of significant quantities and mass fractions of the selected fissile nuclides ~~includes only~~ ^{233}U, ^{235}U, ^{239}Pu and/or ^{241}Pu, subject to a number of exceptions. Other fissile nuclides may require accounting for in a subcriticality assessment.	The fissile material definition in SSR-6 is a practical solution to specify the provisions. Other fissile nuclides may need consideration in a safety assessment (e.g. ^{243}Cm in burnup credit).	X			
574.	JPN009	5.92./L 1	This publication also covers those research and development laboratories that ~~that~~ handle or utilize fissile material in sufficient quantities for criticality to be credible.	Editorial.	X			
575.	SWE152	5.92/2-3	for criticality to be ~~credible~~ a potential threat.	To determine that criticality is not credible, some assessment is required.		X		Modified by other comments.
576.	SWE154	5.93/6	Examples of special fissionable (including fissile) and non-fissionable nuclides …	A mixture of all nuclide types.	X			
577.	SWE155	5.94/4 and 5.95/4	subcriticality-controlled area	Criticality control is for a reactor	X			

578.	GER050	5.95 Line 2	…. The management system should ensure that the combining of material from another criticality controlled area or the movement of moderators into an area is restricted and that such movement is subjected to a criticality safety assessment	Clarification of sentence	X			
579.	FIN025	5.98		Reference to para 5.86 should be corrected. Para 5.86 does not mention any materials	X			
580.	FRA110	5.98	Particular challenges will be encountered in determining the critical mass of unusual materials, such as some of those listed in para. ~~5.86~~ 5.93.		X			
581.	GER051	5.98 Line 2	… such as some of those listed in para. ~~5.86~~ 5.93 and other exotic trans-plutonium materials	Check correctness of reference	X			
582.	SWE156	5.98/1-2	unusual materials which contain significant fractions of special nuclides	The special nuclides may not be available separately.	X			
583.	SWE157	5.98/1-2	~~5.86~~ 5.93 (with references) ~~and other exotic trans-plutonium materials~~	The nuclides are not exotic. In irradiated fuel.	X			
584.	SWE158	5.98/3	~~no~~ few criticality experiment benchmarks with which k_{eff} ~~criticality~~ computations with these nuclides and materials	There are critical experiments where ^{237}Np is present in significant fractions.	X			

585.	CAN038	5.99	Technical: ~~Subcritical assemblies have the potential for criticality accidents but should be considered as reactor cores; consequently, criticality safety measures, as described in the previous sections, may not be sufficient~~ Subcritical assemblies have the potential for criticality accidents; as such, criticality safety measures, as described in the previous sections, should be applied.	Replace the modification with the text proposed during consultancy meetings. Justification: its technical content and the emphasize is the opposite to what criticality safety experts agreed upon. The proper exclusion/warning should apply to reactors or other facilities that are designed to be critical, not subcritical! For example, ANSI/ANS-8.1, Canadian REGDOC-2.4.3, and other documents state that information set out in those standards applies to operations with fissionable materials outside nuclear reactors, except for the assembly of these materials under controlled conditions (such as in critical experiments). The recommendations of the rest of the draft apply to the subcritical assemblies. One specific feature is that k_{eff} (or closely related parameters such as “inverse count rate”) may be used as a control (see comment on para 2.10).	X			

586.	FRA111	5.99	~~Subcritical assemblies have the potential for criticality accidents but should be considered as reactor cores; consequently, criticality safety measures, as described in the previous sections, may not be sufficient~~ ~~Subcritical assemblies have the potential for criticality accidents; as such, criticality safety measures, as described in the previous sections, should be applied.~~	It is not necessary that subcritical assemblies, which, by definition, are not intended (and thus designed) to be critical, have to be considered as reactor cores. The recommendations of the rest of the doc apply to these assemblies. One specificity is that keff (or closely related parameters such as "inverse count rate") may be used as a control (see comment on para 2.10). Not added in the proposed change but could be.			X	The justification provided does not contradict the provision, so we suggest to keep it. It is just to provide further guidance/reference for subcritical assemblies.
587.	PAK004	5.99	Subcritical assemblies are generally used for research and educational purposes. Subcritical assemblies have the potential for criticality accidents but should be considered as reactor cores; consequently, criticality safety measures, as described in the previous sections, may not be sufficient. **Further details may be found in Annex II of SSR-3 [51] which provides an overview of the application of the safety requirements to subcritical assemblies.**	The bold text may be added.	X			
588.	TUR030	5.99		The second sentence of this Para. is not clear, should be rephrased.	X			

589.	USA018	5.99	Technical: ~~Subcritical assemblies have the potential for criticality accidents but should be considered as reactor cores; consequently, criticality safety measures, as described in the previous sections, may not be sufficient~~	Delete the modification because its technical content and the emphasize is the opposite to what criticality safety experts agreed upon. The proper exclusion/warning should apply to reactors or other facilities that are designed to be critical, not subcritical. For example, ANSI/ANS-8.1, Canadian REGDOC 2.4.3, and other documents state that information set out in those documents applies to operations with fissionable materials outside nuclear reactors, except for the assembly of these materials under controlled conditions (such as in critical experiments).			X	The text was modified in line with comment No. CAN038 which is in line with experts agreement during the consultancies. CAN038 refers to the same standard as this comment.
590.	WNTI31	5.99	**~~Subcritical assemblies~~** ~~5.99 Subcritical assemblies are generally used for research and educational purposes. Subcritical assemblies have the potential for criticality accidents but should be considered as reactor cores; consequently, criticality safety measures, as described in the previous sections, may not be sufficient.~~	What is “subcritical assemblies”? This term is not listed even in the Safety Glossary. It should be defined if considered necessary.		X		This para. includes a reference to SSR-3 which includes subcritical assemblies.

591.	FRA112	6.0		This chapter should emphasize the need for neutron portable detector for emergency teams. This kind of device is not usual (compared to gamma portable detector) but neutrons are produced by criticality accident		X		No suggested wording was provided. Section 6 discusses both neutron and gamma dose contribution, states that criticality accident detection can be accomplished by either neutron or gamma detection, and that personnel dosimeters should be provided that monitor both gamma and neutron radiation. By this we believe the intent of the comment is covered.
592.	CAN039	6.01	Editorial: - typo... " it does highlight", not " highlights"	Typo	X			

593.	WNTI32	6.01	6.1 Further recommendations and guidance are provided in IAEA Safety Standard Series Nos GSG-2, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency [37], GS-G-2.1, Arrangements for Preparedness for a Nuclear or Radiological Emergency [38], ~~and~~ GSG-11, Arrangements for the Termination of a Nuclear or Radiological Emergency [39] and TS-G-1.2 [xx], Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material.	TS-G-1.2 for transport emergency should be added.	X			
594.	EGY013	6.01 line 6	No.	instead of Nos (printing error)	X			
595.	GER052	6.01 Line 2	… It does not cover all aspects of emergency preparedness and response, however, it does ~~highlights~~ highlight elements that are specific…	Wording	X			
596.	CAN040	6.04	Editorial: Remove comma in the following text: very low probability, events	The comma is in the middle of the term “very low probability events”	X			

597.	CAN041	6.04	Technical: For each facility in which fissile material is handled and for which a criticality detection and alarm system is required (see para. 6.149 of SSR-4 [1]) an emergency plan, procedures and capabilities to respond to ~~credibly~~ foreseeable criticality accidents are also required,	Use of term credible for the purposes of para 6.4 is not technically sound and inconsistent with content and terminology used in SSR-4, requirements 15 and 16, paras 6.44, 6.173 and in this draft, paras 6.42 (a) and (b) as well as in a few paras, which are now deleted from the emergency response part of the draft.	X			
598.	CAN042	6.04	Editorial: Remove a para number (6.5) from the middle of the sentence: In some circumstances where a criticality detection and alarm system is not installed (e.g. shielded facilities), analyses should still be conducted to determine whether an emergency ~~6.5~~ plan is necessary for the facility.	Typo	X			
599.	EGY014	6.04	Para 6.4 ended with whether an emergency and it should be completed with para 6.5		X			
600.	UK013	6.04	For each facility in which fissile material is handled and for which a criticality detection and alarm system is required (see para. 6.149 of SSR-4 [1])	This should at least refer to the text discussing the need for a criticality detection and alarm system (para 6.39 onwards).			X	The suggested reference is confusing. Paras. 6.139-6.148 do not mention criticality alarm system.
601.	UK059	6.04	“respond to credible criticality accidents…”	Typo. Currently “credibly criticality accidents”	X			

602.	FIN026	6.05	/2-3… an emergency plan, procedures and capabilities to respond to credibl**e**~~y~~ criticality accidents are also required, … Another option would be: … an emergency plan, procedures and capabilities to respond credibly to criticality accidents are also required	misprint/typo?		X		“credible” was replaced following other comment
603.	FRA113	6.05	*Move this back to 6.4*	Wording mistake	X			
604.	FIN027	6.06	~~The criticality safety analysis required for emergency preparedness and response is required to~~ The analysis of consequences of criticality that may be used for the emergency preparedness and response should consider…	Criticality safety analysis demonstrates the subcriticality of the facility. It is not used for emergency preparedness. For some facilities consequences of criticality may be assessed. The consequence analysis therefore may be part of the criticality safety assessment. Therefore "should" (and not "is required to").	X			
605.	FRA114	6.06	In demonstrating the adequacy of the emergency arrangements, the potential occupational exposures and, if relevant, the dose to a member of the public exposures from ~~external~~ radiation exposure should be calculated	For the public, internal exposure as a result of ingestion/inhalation of the release is also to be considered (not just external exposure).	X			

606.	UK019	6.09	Consideration should be given to limiting or terminating off-site releases by shutting down facility ventilation systems in the event of criticality accident. The effects of implementing such measure should be considered, including the possibility of an increase in hydrogen gas concentration due to radiolysis.	Radiolysis is not the only factor to take into account	X			We agree. There is no suggestion in the comment how to modify the text.
607.	FRA115	6.10	It should be ensured that operating personnel are aware that following the initial fission spike(s), the system might return to a state at or very close to critical but with a continuing low fission rate.	The term “at or” seems incorrect □ “that is” instead ?	X			
608.	FRA116	6.11	Experience has shown that the main risk in a criticality accident is to operating personnel in the immediate vicinity of the event. Generally, radiation doses to operating personnel more than a few tens of metres away are not immediate life threatening	Without shielding, a few tens of meters away, we can have the order of 1 Sv, which is a lot... adding "immediate" allow to precise the statement	X			
609.	SWE160	6.11/2	To ensure that future operations will not introduce other, or more severe, types of hazards, emergency preparedness requires determination of all potential consequences of a criticality accident. Para. 6.09 refers to potential generation of hydrogen gas.	Not only radiological consequences need to be determined.			X	Para 6.11 is about “re-entry” to the facility, not about other than radiological hazards.

610.	FRA117	6.14	Evacuation should follow the quickest and most direct routes practicable, with consideration given to the need to minimize radiation exposure. As usual radiation protection controls may be skipped for such an evacuation, appropriate controls should then be done at the gathering point.	The dose delivered to an operator staying for too long close to a criticality accident can be significantly higher than the dose due to a lack of cleaning before evacuation.			X	The proposed addition does not contradict what is already written. We suggest to leave it as it is.
611.	UK014	6.14	Evacuation routes should minimize radiation exposure, for example avoiding potential sites of a criticality accident and following the quickest and most direct routes practicable.	The principle to follow is one of minimizing risk, primarily from radiation exposure, not necessarily following the quickest possible route		X		These are only examples. The text was modified.
612.	CAN043	6.19, 6.21-6.23	Technical: Remove paras 6.19, 6.21-6.23	Content of these paras of subsection “Medical considerations” is out of scope of this guide because these are relevant only to the medical staff whereas criticality safety topics, which are directly or indirectly relevant to medical considerations, are already covered in other existing paras.			X	Medical aspects were addressed also in current SSG-27

613.	FRA118	6.19,-6.21-6.23	Remove paras 6.19,-6.21-6.23	Content of these paras of subsection “Medical considerations” is out of scope of this guide because these are relevant only to the medical staff whereas criticality safety topics, which are directly or indirectly relevant to medical considerations, are already covered in other existing paras. Other paras in this section (6.18, 6.20 and 6.24) are in interface between NCS and Medics and add value.	X			
614.	GER053	6.2 Line 4	… or a release of radioactive material within the facility and/or to the environment, which ~~necessitate~~ necessitates emergency response actions.	Wording	X			
615.	SWE159	6.2/6	The kinetic energy release from a criticality accident could itself lead to considerable hazards, other than radiological.	This is a fact that is recognized in SSR-4 and elsewhere.	X			
616.	CAN044	6.24	Reconstructing the dose~~s received~~ distribution in the human body will be critical to the medical response	The key parameter for medical response, specific to criticality accidents, is the “dose distribution in the human body”. This parameter requires information about orientation of the victim and neutron spectrum (which lead to specific provisions in facilities such as “criticality belts”, “zone neutron spectrum dosimeters”,…).	X			

617.	FRA119	6.24	Reconstructing the dose~~s received~~ distribution in the human body will be critical to the medical response	The key parameter for medical response, specific to criticality accidents, is the “dose distribution in the human body”. This parameter requires information about orientation of the victim and neutron spectrum (which lead to specific provisions in facilities such as “criticality belts”, “zone neutron spectrum dosemeters”,…).	X			
618.	FRA120	6.26	(e) the orientation of the victims compared to the criticality accident.	The orientation of the victims compared to the accident is key parameter.	X			
619.	FRA121	6.26	(e) the spectrum of neutrons received by the victims	One of the key parameters	X			
620.	FRA122	6.26 d	Estimations of the dose received by those likely to be affected (i.e. operating personnel). If possible, equivalent doses to organs have to be evaluated in order to proceed to appropriate medical interventions.		X			
621.	SWE161	6.26(b)/1	The power history of the criticality accident (i.e. the number of fissions that have occurred as a function of time);	Power is a function of time and the evolution is important. Number of fissions is energy.	X			
622.	FRA123	6.26.b	The energy released by the criticality accident (i.e. the number of fissions that have occurred);	Power is expressed in fissions/sec	X			
623.	GER054	6.27 d) footnote 20	A quenching mechanism is a physical process other than mechanical damage that limits a fission spike during a nuclear criticality excursion, for example, thermal expansion or micro-bubble formation in solutions [1713].	Reference does not seem to be correct.	X			

624.	FRA124	6.32 (a)	The mass of the fissile region…	The mass (not the volume) is the key parameter affecting the fission yield because heating is based on the mass, not the volume	X			
625.	SWE162	6.32 +6.33+6 .34	Move this information to new Section 2.	What can happen is essential as a background to the Guide and should come earlier.			X	New section was not created, see the corresponding comments.
626.	JPN010	6.32. (c) Footnote 21/L4	…decrease the effective neutron multiplication factor (k~~eff~~$_{eff}$) of a system.	Subscript.	X			
627.	FRA125	6.39	~~In determining this evaluation, consideration should be given to all processes, including those in which neutron moderators or reflectors more effective than water may be present.~~	This sentence is not useful and is not the main aspect to determine the need for a criticality detection and alarm system			X	We agree it is not the main aspect, however it is one of the guiding principles which might be useful for some instances. We suggest keeping it. It is an existing already approved text.
628.	UK015	6.39	The need for a criticality detection and alarm system should be evaluated for all facilities and activities involving, or potentially involving, the risk of criticality	Second sentence is superfluous. This is an incomplete set of conditions which need to be assessed and is bounded by the requirements of the first sentence.	X			

629.	JPN011	6.39.	The need for a criticality detection and alarm system should be evaluated for all facilities, procedures and activities involving, the risk of criticality. In this evaluation, consideration should be given to all processes, including those in which neutron moderators or reflectors more effective than water may be present.	The criticality detection and alarm system requires consideration of procedures in addition to equipment and human behavior.			X	Yes, we agree procedures are required. However the provision says that criticality detection and alarm systems are required for each facility and activity. Procedures do not require detection system, it is vice versa.
630.	FIN028	6.41	… should provide effective ~~means of~~ information to enable minimizing the total dose…	Detection and alarm system provide information. The means to minimize the dose are the actions initiated based on this information. Please change is required to should.	X			
631.	FRA126	6.41	When installed, the criticality detection and alarm system is required to provide effective means of minimizing the total dose received by personnel from a criticality accident and to initiate mitigating actions. Personnel must be trained to know what to do if the criticality alarm goes off. Periodic exercises must be carried out	Staff training is a key point to minimize dose in case of criticality accident		X		New para added to cover this.
632.	UK016	6.41	When installed, the criticality detection and alarm system is required to initiate mitigating actions to provide effective means of minimizing the total dose received by personnel from a criticality accident.	The system provides an alarm to allow mitigating actions to be taken, it does not provide other means of dose minimization	X			

633.	FRA127	6.42	Justification of any exceptions to the need to provide a criticality detection and alarm system should be provided and could be based upon the following cases: […] The transportation of fissile materials does not require criticality detection and alarm systems for these reasons. […] In credible abnormal conditions during transport, such as immersion of packages under water where the water provides shielding. […]	Do not make a special case for transport Not pragmatic, not self-sufficient. “credible abnormal conditions” are not mentioned in the transport regulations.	X			
634.	FRA128	6.42	(b) Shielded facilities in which the potential for a criticality accident is foreseeable but the resulting radiation dose at the outer surface of the ~~facility~~ unit where the accident occurred would be lower than the acceptable level. Examples of such ~~facilities~~ unit might include hot cells and closed underground repositories.	Clarification	X			
635.	UK017	6.42		This provides no specific evidence why this applies to ALL transport. Is this meant to apply to all transport, or just that covered under SSR-6 (which is already covered by (d).		X		See the modified text
636.	UK018	6.42	Add new subpara 6.42(e) (e) where potential operational and public exposures doses are below emergency action levels	Standard practice to have exposure levels beneath which a detection and alarm system is not justified		X		We believe it is already covered by (b)

637.	JPN030	6.42-(b)	(b) … The transport ~~transportation~~ of fissile materials ~~s~~ does not …	"Transport" is used in the IAEA documents.	X			
638.	SWE163	6.42(c)	Move to para. 5.84. ~~In credible abnormal conditions during transport, such as…~~	In the wrong location.			X	It is in the right place, this section summarizes guidance related to criticality and alarm systems.
639.	JPN031	6.42-(c)	(c) In accident ~~credible~~ conditions of ~~during~~ transport such as …	"Accident conditions of transport" is the defined term in the Transport Regulations.			X	We agree that this is true for the transport safety analysis, however for criticality safety this is the right terminology.
640.	WNTI33	6.42-(c)	~~(c) In credible abnormal conditions during transport, such as immersion of packages under water where the water provides shielding.~~	Para. 6.42 (a) mentions transport does not require criticality detection and alarm.		X		The text was modified following other comments.
641.	WNTI34	6.42-(d)	(d) Packages ~~requiring competent authority approval~~ for fissile material ~~awaiting shipment~~ loading or ~~during shipment or awaiting unpacking~~ unloading	There is no need to limit the CA approval. Para. 6.42 (a) mentions transport does not require criticality detection and alarm. "Loading" and "unloading" are more appropriate than "awaiting shipment" and "awaiting unpacking".		X		The text was modified following other comments, combined with previous bullet.
642.	SWE165	6.43/2	An example is emergency response to a transport accident involving fissile material.	The conditions may be difficult to assess at the time.	X			

643.	FRA129	6.44	The criticality detection and alarm system should be based on the detection of neutron and~~/or~~ gamma radiation. Consequently, consideration should be given to the deployment of detectors that are sensitive to both gamma radiation ~~or~~ and neutron radiation, ~~or both~~	Both are needed (there are both neutrons and gamma rays emitted during a criticality accident and the ratio between these 2 components varies enormously	X			
644.	JPN012	6.44.	The criticality detection and alarm system should be based on the detection of neutrons and/or gamma radiation. Consequently, consideration should be given to the deployment of detectors that are sensitive to ~~gamma radiation or neutron radiation~~ neutron radiation or gamma radiation, or both. If applicable, other reliable and practical methods could be adopted.	1) Optimization of word order. FP gas monitor is rather reliable method to detect criticality accident in certain nuclear fuel fabrication facilities.	X			
645.	FRA130	6.45	In areas in which criticality alarm coverage is necessary, means are required to be provided to detect excessive radiation doses and/or dose rates and to trigger an alarm for the evacuation of personnel.	Both are possible	X			
646.	JPN013	6.57.	Each audible signal generator should be tested periodically. Field ~~trials~~ tests should be carried out to verify that the signal is audible above background noise throughout all areas to be evacuated.	Unifying terms.	X			

647.	JPN014	6.58.	Where tests reveal inadequate performance of the criticality detection and alarm systems, management should be notified immediately, and corrective actions should be agreed and taken without delay. Other measures (e.g. mobile detection systems) may need to be installed to compensate for defective criticality detection and alarm systems.	1) Unifying terms. Typo.	X				
648.	CAN045	List of references	INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, Nuclear criticality safety – Solid waste excluding irradiated and non-irradiated nuclear fuel ISO 22946, ISO, Geneva (2020). INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, Nuclear criticality safety – Geometrical ~~nuclear criticality safety~~ dimensions for subcriticality control – Equipment and layout, ISO ~~FDIS~~ 21391, ISO, Geneva (2019).	These ISO standards (22946 and 21391) are now published. The first one can be added to the references and the second one can be referred to as an international standard (and no more a FDIS) with its definitive title.	X				

649.	FRA131	List of references	INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, Nuclear criticality safety, Nuclear criticality safety training for operations, ISO 23133, ISO, Geneva (2020). INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, Nuclear criticality safety – Geometrical nuclear criticality safety dimensions for subcriticality control – Equipement and layout, ISO FDIS 21391, ISO, Geneva (2019).	These ISO standards (22946 and 21391) are now published. The first one can be added to the references and the second one can be referred to as an international standard (and no more a FDIS) with its definitive title.	X			
650.	SWE07	New II.1	II.1. Criticality means the state of a just (balanced) self-sustaining fission chain reaction based on free neutron transport and fissionable (including fissile) material. Supercriticality means the state of a divergent (increasing power), self-sustaining fission chain reaction. Subcriticality is the state of a fission chain reaction that is not self-sustaining. Whenever handling of substantial quantities and concentrations of fissionable material is planned, the potential for criticality is required to be considered.	These are basic concepts which may be defined elsewhere but should be repeated and confirmed in this document. The IAEA Safety Glossary needs input from specialised documents such as this. The last sentence introductory covers both design and operational subcriticality as well as emergency preparedness.			X	"Criticality" is already defined in the IAEA Safety glossary. The proposed guide makes a reference to this. Other definitions do not seem to be necessary or useful for the purpose of this guide.

651.	SWE16	New II.10	II.10. The SSR-4 [1] objectives and scope (paras. 105-112, with subpara. 111(c) using release of HF as an example) clarifies that all accident consequences attributable to the energy release during a criticality accident are required to be accounted for, including non-radiological consequences. SSR-4 [1] Requirement 20 para. 6.65 states that “Non-radiological consequences of operation of the nuclear fuel cycle facility shall be considered in the safety analysis”. The energy release during a criticality accident is covered in SSR-4 [1] Requirement 22, para. 6.88: “Consideration shall be given to the strengthening of structures to withstand or mitigate the effects of accident conditions such as explosion or criticality”.	Related to the previous comment. Conservatism in subcriticality assessment is not the same as conservatism in criticality safety assessment. This applies to radiological consequences but may be applied to other expressions of the energy release during a criticality accident.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
652.	SWE17	New II.11	II.11. Fissile material handling presents an additional, cliff edge hazard through its self-sustaining fission chain reaction capability. Independent of any abnormal conditions, there are no consequences while subcriticality is maintained. This is unlike the radioactivity hazard which is always present and where both normal and abnormal conditions lead to radiological consequences. The criticality and radioactivity hazards should thus be assessed and controlled separately, with appropriate attention given to areas of conflict of interest or confusion.	Being different by nature, criticality and radioactivity should be considered as separate hazards. Both may lead to radiological consequences, even heat generation, but the physics and the energy releases are substantially different. The safety assessments and controls are fundamentally different.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.

653.	SWE19	New II.12	II.12. Implementation of plans for a new facility or a significantly new activity, involving fissile materials outside of a reactor core, requires accounting for the general requirements applicable to handling radioactive materials. In addition, the potentials for criticality accidents and their credible consequences (including non-radiological) are required to be determined. Requirements to estimate consequences of accidents are covered in SSR-4 [1], e.g. Requirement 1, para. 306.	Criticality safety is an additional responsibility that may require more and different considerations than initial plans may indicate.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.

654.	SWE20	New II.13	II.13. Identification of potential criticality accident scenarios and estimation of their consequences may affect siting and design of a facility and of specific activities, selection of technical solutions, co-location with other activities, accounting for and control of fissile material, security, safety organisation, training, licensing, criticality detection and alarm, evacuation plans, radiation dose measurement, procedures for stopping an ongoing and reoccurrence of criticality excursions, medical preparedness, plans for handling other hazards affected by the accident (e.g. chemical), coordination emergency authorities, site recovery, etc. Early preparations should be made to support more detailed, but overall balanced, technical and administrative solutions later.	Early preparation for new challenges will support better detailed solutions later.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
655.	SWE21	New II.14	II.14. Determination of potential criticality accident conditions and credible consequences should initially assume no measures to prevent the accident or to mitigate its consequences. Later, the implemented safety measures (accounting for human factor effects) and emergency preparedness should reduce the estimated residual risk.	The first question may be: What is there to worry about? This should be answered early during the plans for new types of operations.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.

656.	SWE22	New II.15	II.15. An initial step is to determine the properties of the fissile materials to be considered. Nuclear, chemical and physical data are all essential. For large scale handling of a new type of fissile material, specific measurements may be justified to obtain more information to support determination of criticality for relevant parameters and the excursion evolution due to parameter changes.	Sometimes new types of fissile material may require substantial efforts to determine their properties. An example is low-moderated MOX powder, present during fuel fabrication, for which nuclear data are still not very accurate or difficult to validate.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
657.	SWE23	New II.16	II.16. The final selection of fissile materials, facility construction, equipment, processes, controls, etc. should be made to reduce the potential for a criticality accident. The overall implementation should be evaluated for credible consequences of a criticality accident. That foreseeable accident should be assumed even though it is estimated to have a lower probability than what corresponds to credible accident conditions.	The residual risks for various criticality accident scenario should be estimated.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
658.	SWE24	New II.17	II.17. In addition to experience from criticality accidents in handling of fissile materials outside of reactor cores and from reactivity accidents in reactor cores, there are many measurements of supercritical excursions. This can be used to draw direct conclusions and as a basis for development and validation of calculation methods for prediction of excursion evolutions.	There is plenty of experience from criticality excursions and from reactivity accidents and measurements. This should be applied to assessment of criticality accident consequences.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.

659.	SWE25	New II.18	II.18. A supercritical excursion depends on many circumstances. The evolution is primarily determined by the parameter, speed and total magnitude of changes that cause the excursion together with the feedback from the released fission energy. The energy release eventually returns the excursion to a permanently subcritical state, to a steady critical state or to a pulsating state where re-criticality may occur many times.	Understanding of the potential excursion behaviour during a credible criticality accident provides essential information for emergency response and for reliable information to management, authorities and the public.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
660.	SWE26	New II.19	II.19. The final assessment of residual criticality accident scenarios and consequences should be used for detailed emergency preparedness, including testing and training. Maintenance may require substantial modifications to account for changed circumstances.	Emergency preparedness requires follow-up, testing, modification.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
661.	SWE08	NEW II.2	II.2. Criticality and supercriticality are intentionally achieved to produce fission energy, for some purpose(s). The energy release from an inadvertent (unintended) criticality, associated with at least some initial supercriticality, is defined as a criticality accident. The scenario is often described as an excursion. The accident term should be applied even if no significant safety consequences are expected from an excursion.	This is also a repetition of established but very essential terminology. The last sentence guides the reader to why an event that appears to cause no harm (e.g. a short criticality event in a fuel pool) still should be classified as an accident.			X	“Criticality” is already defined in the IAEA Safety glossary. The proposed guide makes a reference to this. Other definitions do not seem to be necessary or useful for the purpose of this guide.

662.	SWE27	New II.20	II.20. During assessment of potential criticality accident scenarios for a new facility or activity, any significant deviation from previous experience or assessments should be observed. It may result in some standards and regulations being incomplete or even inappropriate for application on the new facility or activity.	Standards and regulations build on experience to a large degree. Sometimes learning from experience is too late.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
663.	SWE28	New II.21	II.21. Determination of criticality accident consequences may not be an explicit requirement in some standards and regulations. The designers and operators of new facilities or activities should be aware of the limitations of applicability of such standards and regulations. The IAEA transport regulations, SSR-6 [6] is an example. They are based on a set of circumstances (some from the early 1960's) with bounding assumptions that should be recognized and assessed when potentially insufficient. Since 1996, SSR-6 para 683(a) requires a specific scenario for air transport, in recognition of potentially more serious consequences than expected from a "traditional" criticality accident.	Lack of specific requirements to account for new types of fissile materials or to assess credible criticality accident consequences does not mean that those issues have not been considered when the requirements were prepared and approved. Having the basis for the regulations and standards is essential for safe application.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.

664.	SWE29	New II.22	II.22. The defence in depth level three should be applied to ensure that a criticality excursion preferably shuts itself down quickly and permanently or at least that it is reduced to a low power excursion. An auto-catalytic reaction (a cliff edge effect), where the power-feedback is positive should be prevented by design.	There have been some discussions on autocatalytic excursion, e.g. in final disposal of plutonium. Awareness of such potentials would lead to designs and operations that make them impossible.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
665.	SWE31	New II.23	II.23. SSR-4 [1] Requirement 38, separates assessment of design from that of operation. Design mitigation to prepare for a postulated criticality accident is covered specifically in Requirement 38 paras 6.149 and 6.150. The criticality safety assessment for a design of a facility or activity is essential for a safe and efficient operation.	The better the design assessment, the easier the maintenance of subcriticality during operation and the better the response to credible accident conditions and, at worst, a criticality accident.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
666.	SWE33	New II.24	II.24. Demonstration of actual maintaining of subcriticality can only be made under real circumstances. This means, SSR-4 [1] Requirement 66, “under operational states and conditions that are referred to as credible abnormal conditions or conditions included in the design basis”.	Demonstration of subcriticality could not be made for a design, it can only be made for actual operations.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.

667.	SWE34	New II.25	II.25. Demonstration of criticality safety also means achieving the emergency preparedness (criticality detection and alarm, evacuation, etc.) specified in the design assessment. That is more difficult to demonstrate, none of the criticality accident scenarios are expected to occur. Requirement 72 of SSR-4 [1] covers emergency preparedness by the operational organization. Requirement 73 of SSR-4 covers a feedback programme to learn from events at the facility as well as from other facilities and activities worldwide.	There are several ways to make sure that emergency preparedness would actually work to reduce the consequences of a criticality accident.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
668.	SWE36	New II.26	II.26. Two different approaches, referred to as “deterministic” and “probabilistic”, to subcriticality assessment are essential concepts in SSR-4 [1], see e.g. Requirements 9, 13, 19, 20 and 21. The meaning of those terms, in particular “deterministic”, may not be obvious since all safety analysis requires some degree of probabilistic assumptions. An example from requirement 20, para. 6.70: “In setting acceptable limits for design basis accidents, the risks from adverse events shall be characterized as tolerable risks or unacceptable risks depending on both the severity of the consequences and the frequency or probability of occurrence”. An alternative term is “qualitative”.	Deterministic analysis appears to contain significant probabilistic assumptions and the results are often expressed as probability judgments.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.

669.	SWE37	New II.27	2.27. Deterministic is often associated with numerical calculation methods such as diffusion or Sn theory, while probabilistic is associated with Monte Carlo methods. Deterministic means that the same result should be obtained if the method is repeated at different times or by different users. In criticality safety assessment it appears to be most appropriate to consider a combined approach, applying fixed criteria together with operation-specific probabilities.	Deterministic methods often apply 95/95 probability-confidence limits. They are probabilistic and, for large standard deviations, could “hide” reductions of the subcritical margin significantly. Probabilistic methods typically have insufficient or unreliable input data, in particular for human factor effects.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
670.	SWE09	New II.3	II.3. Criticality safety means protection against consequences of a postulated criticality accident, preferably by prevention of the accident. Subcriticality of the fissionable material handling should always be maintained under all normal and credible accident conditions (including effects of the human factor). However, a criticality accident should be prepared for, even if the estimated probability is below what corresponds to the criteria for credible accident conditions.	Continued focusing in on criticality safety and why prevention is not sufficient for declaring criticality safety as acceptable.			X	“Criticality” is already defined in the IAEA Safety glossary. The proposed guide makes a reference to this. Other definitions do not seem to be necessary or useful for the purpose of this guide.

671.	SWE10	New II.4	II.4. Prevention of a criticality accident is also referred to as maintenance (or preservation) of subcriticality. Subcriticality assessment of is essential but not sufficient to cover criticality safety assessment. The differences between these assessments should be made clear or incorrect conclusions may be drawn. An assumption that is conservative in a subcriticality assessment may not be conservative in the overall criticality safety assessment (e.g. a less severe criticality accident than what could be expected).	Same as previous reason, with a focus here on assessments (used frequently in SSR-4 and in the draft Guide).			X	"Criticality" is already defined in the IAEA Safety glossary. The proposed guide makes a reference to this. Other definitions do not seem to be necessary or useful for the purpose of this guide.
672.	SWE11	New II.5	II.5. This document excludes fissionable materials that do not contain sufficient quantities and mass fractions of fissile nuclides to be classified as fissile materials in a specific operation. The scope is thus limited to fissile materials. This may change in the future and plans for operations with new types of fissionable but non-fissile materials should account for any criticality potential. The definition of fissile material may differ between different applications. Natural uranium has been demonstrated to be a fissile material in nuclear reactors but in most applications outside of the reactor core (including public transport), natural uranium may be exempted as a fissile material. Natural uranium still needs to be accounted for as a safety factor if it is present together with fissile materials.	The concept of fissile material is not as simple as some may have believed. Unlike fissile nuclides and fissionable nuclides, which are scientifically defined, the materials are defined from a practical point of view. Plans for new types of fissionable material in nuclear facilities and in transport may require attention. The description of natural uranium classification is also a theme that keeps coming back as questions to criticality safety practitioners.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.

673.	SWE12	New II.6	II.6. Demonstration of subcriticality of a design or of a real operation does not account for radioactivity of the fissile material. In a neutron transport equation, any external or internal neutron source is excluded when the neutron multiplication factor is determined. In a measurement, only neutrons from a specific fission chain reaction are accounted for, other neutrons need to be screened out. Even the measured fissions need to be weighted to obtain the correct self-generating fission distribution.	The basis for maintaining subcriticality is not related to radioactivity. Ionizing radiation becomes a factor first when a criticality accident is considered. This para. does not contain any direct recommendation but gives guidance on how subcriticality is typically determined, by calculation or by measurement.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
674.	SWE13	New II.7	Conveniently, fissile materials are classified as being radioactive materials. Radioactivity does not affect subcriticality of a given configuration but may have affected its composition and temperature. Radioactivity affects the initiation (internal neutron source) of a supercritical excursion and later stages. Assuming mass fractions of 100 % 235U or 100 % 239Pu may be conservative for subcriticality assessment but may result in unacceptable criticality accident consequences (larger initial energy release). A conservative assumption of fresh fuel rather than irradiated fuel (stored radioactivity) underestimates consequences.	Conservatism in subcriticality assessment is not the same as conservatism in criticality safety assessment. This applies to radiological consequences but may be applied to other expressions of the energy release during the accident.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.

675.	SWE14	New II.8	Neutron multiplication in a material (not necessarily fissile, e.g. natural uranium) may require accounting for in radiological safety. Such calculations or measurements are similar to those made to determine subcriticality.	The neutron multiplication factor may need determination to account for neutron multiplication, even in a non-fissile material. It is not criticality safety.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
676.	SWE15	New II.9	II.9. The energy release during a fission event consists primarily of kinetic energy of fission products with some of the remaining fraction being ionizing radiation energy, including free neutrons. The kinetic energy release may result in a considerable safety threat, including direct injury to people, release of previously contained hazards (e.g. radioactive, chemical, toxicological, combustible) and damage to facilities and equipment. The safety assessment is required to consider such potential consequences.	A criticality accident is defined as an energy release. Direct radiation is a small fraction while the remaining energy release may release stored reactivity, chemical and other hazards. This is not the major experience from criticality accidents, but reactivity accidents demonstrate the potential.			X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
677.	SWE05	New Section Prel. "II"	II CRITICALITY – A JUST SELF-SUSTAINING FISSION CHAIN REACTION	General information and guidance should be found early in the document.			X	This is a revision by amendment, no changes to the structure of the document are allowed except those which were envisaged in the approved DPP.
678.	SWE06	New Section Subtitle	GENERAL	To cover guidance on terminology and physics			X	DTTO as SWE05

679.	SWE35	New Section Subheading	DETERMINISTIC AND PROBABILISTIC ANALYSIS				X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
680.	SWE18	New Subheading	NEW FACILITY OR ACTIVITY				X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.
681.	SWE30	New Subheading	CRITICALITY SAFETY DURING OPERATION				X	Creating new sections/structure of the document is out of the scope of the approved DPP. If essential, some of the elements should be proposed to be inserted in the existing structure.

682.	SWE166	Reference [36] and Annex Relevant literature/ p. 93	AMERICAN NUCLEAR SOCIETY, nuclear criticality safety control of selected actinide nuclides, ANSI/ANS-8.15-2014, ANS, La Grange Park, IL ~~AMERICAN NUCLEAR SOCIETY, Nuclear Criticality Control of Special Actinide Elements, Rep. ANSI/ANS-8.15-1981, ANS, La Grange Park, IL (1981).~~ ~~AMERICAN NUCLEAR SOCIETY, Nuclear Criticality Safety Control of Special Selected Actinide Elements Nuclides, ANSI/ANS-8.15-1981;R1987;R1995;R2005;R2014 (R = Reaffirmed), ANS, La Grange Park, IL~~	This reference has been revised (note lower case initials in title). [36] Old reference. (bottom of page 93) ANSI/ANS standards.	X			
683.	ENISS7	REFERENCES Page 89	[51] AMERICAN NUCLEAR SOCIETY, Nuclear Criticality Safety in Operations with Fissionable Material Operations Outside Reactors, ANSI/ANS, 8.1-2014 (R2018), ANS, La Grange Park, IL.	The revision of ANSI/ANS 8.1 completed in 2014, ANSI/ANS 8.1-2014 (R2018), details the interpretation of “credible abnormal conditions”, in reference with PA (Process analysis) and DCP (Double contingency Principle) and could be a helpful guidance and reference for the user of DS516. See also Comments N°3, N°4, N°6	X			

684.	FRA132	References	[…] [10] INTERNATIONAL ATOMIC ENERGY AGENCY, Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material, (201220 Edition), IAEA Safety Standards Series No. SSG-26, IAEA, Vienna. (A revision of this publication is in preparation.) […]	The SSG-26 seems to be under publication.	X			
685.	PAK005	REFERENCES	[51] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Research Reactors, IAEA Safety Standards Series No. SSR-3, IAEA, Vienna (2016).	To make references consistent with comment at Sr. No. 4.	X			
686.	ENISS6	Relevant Literature ANSI/ANS Standards Page 94	AMERICAN NUCLEAR SOCIETY, Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors, ~~ANSI/ANS-8.1-1998; R2007;R2014~~ ANSI/ANS, 8.1-2014 (R2018) (R = Reaffirmed), ANS, La Grange Park, IL (1998). (see [51] ANSI/ANS, 8.1-2014 (R2018))	See also Comments N°3, N°4, N°7.	X			