DS 511 Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors (Revision of SSG-22)

COMMENTS BY REVIEWER **Reviewer:** Page. **Country/Organization:** Date: 18 June 2021					RESOLUTION			
Comment No.	**Country Comment No.**	**Para/Line No.**	**Proposed new text**	**Reason**	**Accepted**	**Accepted, but modified as follows**	**Rejected**	**Reason for modification/ rejection**
1.	Egypt 1	General	– In the references section, the references numbering from 15 to 18 are repeated so all the numbering after that needs to be modified in addition to their citation number throughout the entire document. – Some reference citation numbers in this document need to be modified according to the modified references section. – There is an inconsistency in the font style when one of the cited requirements is stated (e.g. in para 1.9 and 4.4)			X		The overarching requirements are cited in bold text and requirements referred to para number are not bold. IAEA style of writing.
2.	Egypt 2	Table of content	Add the para number beside its title	For the convenience of the reader	X			
3.	Japan 1	General	The sentence “the requirement to xxx should be applied using a graded approach ...” or “a graded approach should be applied to yyy,” is to be avoided, as it is prerequisite for this draft Safety Guide to use of a graded approach. It would be an important role of this Safety Guide to describe the recommended realistic methods or measures for applying or using a graded approach, for example, “in applying a grade approach to the requirement to xxx, a method or measure should be .... ”			X		We understand the issue raised however, the document is structured in line with the DPP and upfront clarification of whether or not

			In the following comments, this type of comments is not described one by one, or alternative suggestions may be presented as appropriate.				requirement is to be graded is useful for readers. See Egypt comment no. 25, 26 and 30 supporting this approach. In most cases the examples of methods and measures are provided as proposed.
4.	Japan 2	General	There are many paragraphs that do not include any recommended practices (i.e "should" statements) in this draft, especially, more than a half of paragraphs of Sec. 4 and Sec. 6 do not include recommended practices, but only explanations of background information or ordinary practices. Furthermore, the wordings "xxx should be applied commensurate with the potential hazard of the facility" appears many times. However, this expression is not the recommended practice, but requirements specified in SSR-3 in applying a graded approach, and therefore it is no need to describe them one by one as recommendation. If those paragraphs including these wordings are excluded from this draft, those paragraphs which purely include recommended practices may be lesser. Then, it would be questionable to classify this draft as Safety Guide. It is suggested to endeavor to develop a message using "should" statements. Requirement 12 (Use of the graded approach) of SSR-3 states that *"The use of the graded approach in application of the safety requirements for a research*			X	We understand issue raised but this approach is consistent with the DPP. Feedback from Member States has shown it is useful to address the overarching requirements one by one. In some cases the requirements are self-explanatory and no further guidance is required.

			reactor shall be commensurate with the potential hazard of the facility, …" In the comment below, this type of comments are not described one by one, or alternative suggestions may be presented as appropriate.					
Section 1								
5.	Indonesia 1	1.1/2	This Safety Guide provides recommendations on the use of a graded approach in the application of the safety requirements for research reactors, including ~~critical and subcritical assemblies~~, established in IAEA Safety Standards Series No. SSR-3, Safety of Research Reactors [1].	Delete the phrase 'critical and subcritical assemblies' because Para 1.3 of [1] already mentions the inclusion of critical and subcritical assemblies.	X			
6.	Indonesia 2	1.6/5	The Safety Guide provides recommendations on the use of a graded approach in the application of the safety requirements for research reactors, which are established in SSR-3 [1]. This Safety Guide is intended for use by regulatory bodies, operating organizations and other organizations involved in the site evaluation, design, construction, commissioning, operation, and preparation	Adding the phrase "lifetime of research reactors" to imply the inclusion of site evaluation, design, construction, commissioning, operation, and preparation for decommissioning of research reactors.			X	Consistent with approved DPP.

			for decommissioning of research reactors. (Lifetime of research reactors)					
7.	Indonesia 3	1.7/2	The application of a graded approach to all of the activities throughout the lifetime of a research reactor ~~(site evaluation, design, construction, commissioning, operation and preparation for decommissioning)~~	Deleting the phrase" ~~(site evaluation, design, construction, commissioning, operation and preparation for decommissioning)~~ to avoid repetition of the same phrase in Para 1.6			X	See resolution to Indonesia comment 2.
8.	Libya 1	1.7 line 5	[...]A major aspect of this Safety Guide involves the use of a graded approach in the application of the safety requirements for the design and operation of research reactors, so that the fundamental safety objective (see paras 2.2 and 2.3 of SSR-3 [1]) [...].	Improved grammar.	X			Addressed in para 1.9
9.	Indonesia 4	1.8/3	This Safety Guide is primarily intended for use for heterogeneous, thermal spectrum research reactors having a power rating of up to several tens of megawatts. Research reactors of higher power, specialized reactors (e.g., homogeneous reactors, accelerator driven systems, fast spectrum reactors) and	Consistency with para 1.8 of [1]			X	Context of para 1.8 of SSR-3 is different. The relevant examples are already mentioned here.

			reactors having specialized facilities (e.g., hot or cold neutron sources, high pressure and high temperature loops) may need additional guidance.					
10.	Indonesia 5	1.8/5	This Safety Guide is primarily intended for use for heterogeneous, thermal spectrum research reactors having a power rating of up to several tens of megawatts. Research reactors of higher power, specialized reactors (e.g., homogeneous reactors, fast spectrum reactors) and reactors having specialized facilities (e.g., hot or cold neutron sources, high pressure and high temperature loops) may need additional guidance. This Safety Guide applies to existing research reactors to the extent ptracticable	Adding the last sentence to further emphasize the applicability of DS511.	X			See in para 1.11
11.	Libya 2	1.9 line 3	[...]All requirements are applicable to all types of research reactors and cannot be waived. The recommendations provided in this Safety Guide are on	Improved grammar.	X			

			whether and how a graded approach can be applied to these requirements in SSR-3 [1].					
12.	Egypt 3	1.10 / 3	….requirements for ~~regulatory supervision~~ regulatory control or oversght (Section 3),….	The term “regulatory control or oversight” is more relevant than “regulatory “supervision			X	The sections have similar structure to the corresponding section of SSR-3.
13.	Japan 3	1.10/1	Section 2 provides a description of the basic elements of a graded approach and its application. The remaining sections provide recommendations on the application of a graded approach to requirements for regulatory supervision (Section 3); management and verification of safety (Section 4); site evaluation (Section 5); design (Section 6); operation <u>including commissioning</u> (Section 7); and preparation for decommissioning (Section 8). Section 9 discusses Requirement 90 from SSR-3 [1] on the interfaces between safety and	Commissioning is one of the six major stages of the lifetime of an authorized facility defined in the Safety Glossary.			X	The sections have similar structure to the corresponding sections of SSR-3.

			security. Sections 3– 9 have a similar structure to the corresponding sections of SSR-3 [1].					
Section 2								
14.	Indonesia 6	2.2/1	~~Research reactors are used for special and varied purposes, such as research, training, education, radioisotope production, neutron radiography and materials testing. These purposes call for different design features and different operational regimes. Design and operating characteristics of research reactors may vary significantly, in particular the use of experimental devices may introduce specific potential hazards. In addition, the need for flexibility in their use requires a different approach to achieving and managing safety.~~ Research reactors are used for special and varied purposes as referred to in para2.15 of SSR-3[1] which have different design and	To simplify Para 2.2 and refer it to Para 2.15 of [1]			X	The text is retained for clarity and user friendliness.

			operational regimes and requires a different approach to achieving and managing safety.					
15.	Libya 3	2.2 Line 3	[...]The design and operating characteristics of research reactors may vary significantly, in particular the use of experimental devices may introduce specific potential hazards. In addition, the need for flexibility in their use requires a different approach to achieving and managing safety.	Improved grammar.			X	SSR-3 para is quoted as it is.
16.	Japan 4	2.3/3	... For example, the way in which requirements are demonstrated to be met for a multipurpose, high power research reactor might be very different from the way in which the requirements are demonstrated to be met for a research reactor with very low power and very low associated radiation hazard to ~~facility staff~~ workers, the public and the environment.	Consistency.	X			

17.	Japan 5	2.4/1	During the lifetime of a research reactor, the use of a graded approach in the application of the safety requirements should be such that safety functions and operational limits and conditions are preserved, and there are no undue radiation hazards to workers, the public ~~or~~ and the environment.	Editorial.	X			
18.	Egypt 4	2.4 / 3	…., and there are no ~~undue~~ unjustified radiation hazards to workers,…..	The term “unjustified” is more relevant than “undue”			X	Consistent with IAEA glossary and other Safety Standards such as GSR Part 3 and SSR-3.
19.	Japan 6	2.5/1	The use of a graded approach should be based on safety analyses~~,~~ and regulatory requirements and supported by expert judgement. Expert judgement implies that account is taken of the safety functions of structures, systems and components (SSCs) and the consequences of the failure to perform these functions and implies that the judgement is documented and subjected to appropriate review and	Concerning expert judgement, this element is not the same position with safety analyses and regulatory requirements, as described in Requirement 12 of SSR-3, which states *“**The use of the graded approach in application of the safety requirements for a research reactor shall be commensurate with the potential hazard of the facility and shall be based on safety analysis and regulatory requirements**”*. Furthermore, para 6.18 of	X			

			approval using a process in the management system. Prescriptive regulatory approaches , resulting in very detailed regulatory requirements may restrict the use of a graded approach by the operating organisation on some of the topics in this Safety Guide. Other elements to be considered when applying a graded approach are the complexity and the maturity of the technology, operating experience associated with activities and the stage in the lifetime of the facility.	SSR-3 states, *"… Grading of the application of requirements shall be justified and supported by safety analysis or engineering judgement."* These descriptions implies that an existence of expert is just a supporter in all means.				
20.	Libya 4	2.8	Qualitative categorization of the facility should be performed ~~on the basis of~~ based on the potential radiological hazard, using a multi-category system, as follows:	Improved clarity.	X			
21.	Libya 5	2.8 (a)	Facilities with significant potential for an off-site radiological hazard: such facilities include research reactors with high operating power, a large radioactive inventory, or	Improved grammar.			X	Correct as is.

			high-pressure experimental devices. These facilities are categorized as ~~a~~ high potential hazards.					
22.	USA 1	2.8(b)	…reactors with operating power up to a few ~~MW~~ megawatts,…	"MW" is not a defined term. Recommend replacing with "megawatts" as used elsewhere in the document.	X			
23.	Egypt 5	2.9 / 1	Additional characteristics to be considered in ~~deriving the category~~ categorizing of the facility………	The term categorizing is more simple	X			
24.	Indonesia 7	2.9/1	~~Additional characteristics to be considered in deriving the category of the facility in accordance with its potential hazard are listed in para 2.17 of SSR-3 [1], which states:~~ Additional characteristics to be considered in deriving the category of the facility in accordance with its potential hazard are referred to in para 2.17 of SSR-3 [1]	Simplify Para 2.9 and refer it to Para 2.17ng S of [1]			X	The original text is retained for clarity.
25.	Egypt 6	2.9 / item (k)	The ~~ease or difficulty~~ flexability in changing[3] the overall configuration."	The term The flexability is more relevant than The ease or difficulty			X	For consistency with SSR-3.

26.	Egypt 7	2.11 / 1	The safety function, ~~and~~ safety significance and potential risks of SSCs ……..	Editorial correction	X			
27.	Egypt 8	2.11 / 7	~~an~~ the SSC is the basis of a graded approach	Editorial correction	X			
28.	Egypt 9	2.11	the whole paragraph need to be rearranged	long statement is used (Editorial correction)	X			
29.	Egypt 10	2.12	Paras 2.37–2.40 of IAEA Safety Standards Series No. GS-G-3.1, Application of the Management System for Facilities and Activities ~~5]~~[15] provide	Typo error	X			
30.	Libya 6	2.12	[...]Paras 2.37–2.40 of IAEA Safety Standards Series No. GS-G-3.1, Application of the Management System for Facilities and Activities 5] provides recommendations on how elements of the management system can be assessed, to support a graded approach in the application of management system requirements.	Improved grammar	X			
31.	Japan 7	2.13./1	The analysis in step 2 to determine how requirements related to	The analysis should be carried out using objective data and established		X The insight from expert judgement		For clarity.

			SSCs and/or management system elements are met should consider the overall categorization of the facility from step 1, the safety significance of the SSC and/or element of the management system which is affected, and therefore the appropriate level of effort needed in meeting the requirement, and the manner in which the requirement will be met. The insights from ~~Expert~~expert ~~judgement~~, from a single expert or a multidisciplinary group as appropriate, may be ~~included in the analysis~~ introduced in decisionmaking prcocess after the results of the analysis are given.	methods independently from expert judgement, and thereafter an insights from an expert or multidisciplinary group might be considered when final decision would be made.		(from a single expert or from a multidisciplinary group, as appropriate), may be introduced into decision making process after the results of this analysis are available		
Section 3								
32.	Egypt 11	3 / title	USE OF A GRADED APPROACH IN THE REGULATORY ~~SUPERVISION~~ CONTROL (or oversight) OF RESEARCH REACTORS	The term "regulatory control (or ovrersight)" is more relevant than "regulatory supervision"			X	The sections have similar structure to the corresponding section of SSR-3.

33.	Egypt 12	3.2, 3.3	The requirements for the legal infrastructure established in GSR Part 1 (Rev. 1) [16] ~~INTERNATIONAL ATOMIC ENERGY AGENCY, Application of the Management System for Facilities and Activities, IAEA Safety Standards Series No. GS-G-3.1, IAEA, Vienna (2006). 3.3. [1616].~~ are placed on the government	– The correct reference citation number in the references section is 16. Clause 3.3 completes the statement in 3.2.	X			
34.	USA 2	3.2-3.3	Remove reference to GS-G-3.1, and merge paragraphs such that beginning of new merged paragraph 3.2 would read: "The requirements for the legal infrastructure established in GSR Part 1 (Rev. 1) [16] are placed on the government…"	Apparent incorrect reference and editorial/formatting errors	X			
35.	Japan 8	3.2. & 3.3.	3.2. The requirements for the legal infrastructure established in GSR Part 1 (Rev. 1) [~~15~~16] ~~INTERNATIONAL ATOMIC ENERGY AGENCY, Application of the Management System for Facilities and Activities, IAEA Safety Standards Series No.~~	Confusion. This para does not say anything on management system and therefore GS-G-3.1 is suggested to be deleted.	X			

			~~GS-G-3.1, IAEA, Vienna (2006).~~ ~~3.3. [1616].~~ are placed on the government (e.g. for the adoption of legislation that assigns the prime responsibility for safety to the operating organization and establishes a regulatory body) and on the regulatory body (e.g. for the establishment of regulations that results in a system of authorization for the regulatory control of nuclear activities and for the enforcement of the regulations). Regarding the application of these requirements, para 3.2 of SSR-3 [1] states that …					
36.	Egypt 13	3.4	In a State where the most hazardous nuclear facility is a single operating research reactor with a low potential hazard ~~(see para. 0)~~	The para. number needs correction		X …(see para 2.8)		Relevant para is referred in para 3.3.
37.	USA 3	3.4	…(see para. ~~0~~2.9)…	Replacement with appropriate paragraph reference		X …(see para 2.8)		See resolution to Egypt comment 13 on same para.
38.	Egypt 14	Page 11 Foot note no 4	Some examples are shown in TECDOC-XXXX, “Application of graded approach in regulating nuclear power plants,	The number of the TECDOC needs to be added	X			TECDOC is under preparation. Its reference number will be added at the final stage.

			research reactors and fuel cycle facilities".					
39.	Egypt 15	3.5	The regulatory body is required to be provided with sufficient authority, and a sufficient number of experienced staff and financial resources to discharge its assigned responsibilities (Requirement 3 of GSR Part 1 (Rev. 1) [16]) ~~[15] INTERNATIONAL ATOMIC ENERGY AGENCY, Application of the Management System for Facilities and Activities, IAEA Safety Standards Series No. GS-G-3.1, IAEA, Vienna (2006).~~	– The reference citation number needs correction. – The format and line spacing is inconsistent	X			
40.	Japan 9	3.5. & 3.6.	~~A~~ When applying a graded approach ~~should be applied~~ in establishing the regulatory body and determining aspects of its organizational framework, ~~based on~~ the potential hazards of all of the facilities and activities under its supervision or oversight should be based on. The regulatory body is	1) It is not "application of a graded approach" itself, but "actions or measures for applying a graded approach" to be recommended in this document. In this context, the wordings "A graded approach should be applied in ..." should be avoided, as it sounds that adoption of a graded approach comes first", which mislead the readers.		X		The text has been modified after technical editorial review.

			required to be provided with sufficient authority, and a sufficient number of experienced staff and financial resources to discharge its assigned responsibilities (see Requirement 3 of GSR Part 1 (Rev. 1) [~~15~~16] ~~INTERNATIONAL ATOMIC ENERGY AGENCY, Application of the Management System for Facilities and Activities, IAEA Safety Standards Series No. GS-G-3.1, IAEA, Vienna (2006)~~. 3.6. ~~[16]).~~ The responsibilities of the regulatory body should include establishing regulations, review and assessment of safety related information ...	The Safety Guide should describe the action or measure for applying a graded approach to a certain subject. In this paragraph, "based on the potential hazards ... " would be a condition in order to apply a graded approach. The same reason as general comment #1. 2) This para does not say anything on management system and therefore GS-G-3.1 is suggested to be deleted.				
41.	USA 4	3.5-3.6	Remove reference to GS-G-3.1, and move [16] reference from 3.6 to 3.5.	Apparent incorrect reference and editorial/formatting errors	X			
42.	Egypt 16	3.6	~~[16]).~~ The responsibilities of the regulatory body should include establishing regulations, ...	Typo error	X			

43.	Belgium 2	3.6	~~[16]).~~ The responsibilities of the regulatory body should include establishing regulations,	Typographical correction	X			
44.	USA 5	3.7	Replace [1818] with correct reference for GSG-12	Incorrect reference number	X			
45.	USA 6	3.7	Replace last sentence of paragraph with: "In developing regulatory requirements, the regulatory body should consider the potential for its regulatory requirements to limit both (1) facilities' ability to appropriately apply a graded approach in their application of safety requirements, and (2) the scope of a graded approach in the application of safety requirements for the regulatory body itself."	Clarity, and think it is appropriate to mention consideration of facilities' ability to grade application of safety requirements as well.		X 3.6. …Regulatory requirements should also consider the potential for limiting facilities' ability to apply a graded approach to these requirements and the scope of a graded approach in the application of safety requirements for regulatory body itself.		For clarity.
46.	Belgium 3	3.7	… Areas where the regulatory body might use a graded approach are identified in IAEA Safety Standards Series GSG-12, Organization, Management and Staffing of the Regulatory Body for Safety [18~~18~~]. Regulatory …	See general comment on References. This is the "first" [18] of the list. + Typographical correction (double 18).	X			

47.	Egypt 17	3.7	Organization, Management and Staffing of the Regulatory Body for Safety [18~~18~~].	Typo error	X			
48.	Israel 1	3.7	Referring to graded approach in organization and functions of the Regulatory Body, paragraph 3.7 presents staffing and resources for in-house technical support as an example of safety requirements that can be met using a graded approach. Since such action can significantly impair certain capabilities of the regulatory body, we strongly recommend to emphasize in this paragraph the advantages of reliance on external experts and/or TSO's for professional/technical areas not "covered" by the existing "reduced" staff.	completeness			X	We understand the concern about impairing the capabilities of regulatory body. Para 3.6 is recommending the use of external experts and/or TSOs to complement the capabilities of regulatory and not to take action that can significantly impair certain capabilities of the regulatory body.

49.	Japan 10	3.7./4	..... Areas where the regulatory body might use a graded approach are identified in IAEA Safety Standards Series GSG-12, Organization, Management and Staffing of the Regulatory Body for Safety [18]. ~~Regulatory requirements should be taken into account as they may limit the scope of a graded approach in the application of requirements for the regulatory body itself.~~	Deleted portion is matter of fact and then it is not worthful to describe here.			X	The text is retained but modified considering USA comment No. 6 on the same para.
50.	Indonesia 9	3.8/2	The authorization process is often performed in steps for the various stages of the lifetime of a research reactor, as described in paras 3.4 and 3.5 of SSR-3 [1]. ~~For a research reactor, these stages include:~~ The authorization process is often performed in steps for the various stages of the lifetime of a research reactor, as refer to paras 3.4 and 3.5 of SSR-3 [1].	Simplify Para 3.8 and refer it to Paras3.4 and 3.5 of [1]			X	SSR-3 para is quoted.
51.	USA 7	3.11	…apply to all research reactors at all stages of the reactor lifetime, and may apply to ~~including~~	Clarity and grammar	X			

			experiments and modifications depending on their importance to safety (see DS510B [11])., at all stages of the reactor lifetime.					
52.	Indonesia 8	3.12/2	analysis report shall be reviewed and assessed by the regulatory body before the research reactor project is authorized to progress to the next stage. The safety analysis report and shall be periodically updated over the research reactor's operating lifetime to reflect modifications made to the facility and on the basis of experience and in accordance with regulatory requirements. , which is used in the review and assessment of facilities and activities and in the authorization of research reactors, are established in Requirement 1 of SSR-3 [1]. The responsibilities of the regulatory body include the review and assessment of safety related information from the safety analysis report. A graded			X The requirements for the safety analysis report, which is used in the review and assessment of facilities and activities and in the authorization of research reactors, are established in Requirement 1 of SSR-3 **Error! Reference source not found.**] states: A safety analysis report shall be prepared by the operating organization for a research reactor facility. The safety analysis report shall provide a justification of the site and the design and shall provide a basis for the safe operation of the research reactor. The		The requirement 1 of SSR-3 is quoted fully.

			approach may be used in the application of these requirements. The level of detail in documentation related to the safety of the facility, including the safety analysis report, should be based on the potential hazard from the facility, and on the stage in the lifetime of the facility.			safety analysis report shall be reviewed and assessed by the regulatory body before the research reactor project is authorized to progress to the next stage. The safety analysis report shall be periodically updated over the research reactor's operating lifetime to reflect modifications made to the facility and on the basis of experience and in accordance with regulatory requirements.		
53.	Japan 11	3.12/1	The requirements for the safety analysis report, which is used in the review and assessment ~~of facilities and activities~~ and ~~in~~ the authorization of research reactors, are established in Requirement 1 of SSR-3 [1].	This Safety Guide is specific to research reactors and then suggested general term "facilities and activities" being deleted.		X		The text is modified, please see resolution to Indonesia comment 8 on same para.
54.	Libya 7	3.13	A graded approach should be used in the preparation of a safety analysis report, for example, the level of detail necessary to demonstrate that acceptance criteria are met should be commensurate	Improved grammar.		X		Para of SSR-3 is quoted.

			with the potential hazard of the research reactor. [...]					
55.	USA 8	3.13	For a facility with a low potential hazard, the safety analysis may include bounding analyses, due to large safety margins in the design, to demonstrate that the research reactor can be operated safely. For research reactors with a higher potential hazard, typically more detailed analysis is necessary to demonstrate safety in all operating and accident conditions, with less use of large bounding analyses.	For clarity swap the two sentences to put “higher” in the correct context meaning more than low potential hazard.	X			
56.	USA 9	3.15	Remove reference to GS-G-3.1	Apparent incorrect reference	X			
57.	Belgium 4	3.15	Something missing in this article? Text above 3.15 should be in the Article?		X			
58.	Egypt 18	3.15	Requirements for inspection and enforcement are established in paras 3.13–3.16 of SSR-3 [1]. For inspections, GSR Part 1 (Rev. 1) [16] ~~[15]~~ ~~INTERNATIONAL~~	– The para before 3.5 should be the start of para 3.5 – The correct reference citation number as in the references section is added Cancel the reference details as it is defined in the references section	X			

			~~ATOMIC ENERGY AGENCY, Application of the Management System for Facilities and Activities, IAEA Safety Standards Series No. GS-G-3.1, IAEA, Vienna (2006). 3.15. [16]~~ states: "The regulatory body shall……..					
59.	Egypt 19	3. 15 / 5	(including ~~scheduled~~ announced inspections and unannounced inspections)	The unannounced inspections is a part from scheduled or planned inspections			X	Requirement is quoted as it is for consistency with GSR Part 1.
60.	Japan 12	3.15./the last bullet	In general, there ~~should~~ may be fewer inspections and hold points for a research reactor with a low potential hazard, compared to those for a research reactor with a higher potential hazard.	"fewer inspections and hold points" is not recommended practice, but allowable practice. The same reason as general comment #2.	X			
61.	Russia 1	3.16/1	Enforcement actions should be commensurated with the consequences of non-compliance *with regulatory requirements.*	Paragraph 3.15 DS511; Paragraph 4.50, Requirement 29, INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal and Regulatory Framework for Safety, IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), IAEA, Vienna (2016). [16]		X		Text modified after technical editorial review.

62.	Russia 2	3.16/4	*In the granting of an authorization for a facility or an activity, the regulatory body may have to impose limits, conditions and controls on the authorized party's subsequent activities. The requirement to implement enforcement actions cannot be applied using a graded approach for non-compliance with any conditions specified in the authorization.*	Paragraph 3.15 DS511; Paragraph 4.31, Requirement 24, INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal and Regulatory Framework for Safety, IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), IAEA, Vienna (2016) [16]; Paragraph 2.14, BASIC LICENSING RINCIPLES, INTERNATIONAL ATOMIC ENERGY AGENCY, Licensing Process for Nuclear Installations, IAEA Specific Safety Guide No. SSG-12, IAEA, Vienna (2010).		X		The text modified after technical editorial review. Para 4.54 of GSR Part 1 clearly states about using graded approach for non-compliance with any conditions specified in the authorization.
63.	Russia 3	3.17/3	(a) The safety significance of the non-compliance or of the violation *of regulatory requirements*;	Paragraph 3.15 DS511; Paragraph 4.50, Requirement 29, INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal and Regulatory Framework for Safety, IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), IAEA, Vienna (2016) [16].	X			
64.	Libya 8	3.17	(a) The safety significance of the non-compliance or ~~of~~ the violation;	Improved clarity.	X			
65.	Japan 13	3.17. (c)	Some of the factors that should be considered in determining the appropriate level of enforcement actions are as follows:	Duplication. Item (c) is already addressed in para 3.18 as intentional violations.			X	Para 3.17 provides additional guidance.

			~~(c) Whether there has been an intentional violation~~					
66.	Japan 14	3.17. (f)	(f) The past safety performance of the authorized party and the performance trend (noting that past good performance does not ease the enforcement imposed.),	Any violation should be judged independently from the past performance.	X			
Section 4								
67.	Belgium 5	Text above 4.1	Requirements for the management system for organizations operating nuclear installations, including research reactors, are established in GSR Part 2 ~~[13]~~ **[14]** [INTERNATIONAL ATOMIC ENERGY AGENCY, Establishing the Safety Infrastructure for a Nuclear Power Programme, IAEA Safety Standards Series No. SSG-16 (Rev. 1), IAEA, Vienna (2020).	GSR Part 2 is not reference [13]; should be [14]?	X			
68.	Belgium 6	4.1	Some text seems to be missing: text above 4.1?			X ‘Requirements for the management system……’		See Egypt comment 20 on same para.

69.	Egypt 20	4.1	Requirements for the management system for organizations operating nuclear installations, including research reactors, are established in GSR Part 2 [14] ~~[13]~~ ~~INTERNATIONAL ATOMIC ENERGY AGENCY, Establishing the Safety Infrastructure for a Nuclear Power Programme, IAEA Safety Standards Series No. SSG-16 (Rev. 1), IAEA, Vienna (2020). 4.1. [1414],~~	– The para before 4.1 should be the start of para 4.1 – The correct reference citation number as in the references section is added – Cancel the reference details as it is defined in the references section	X			
70.	Japan 15	4.1	4.1. Requirements for the management system for organizations operating nuclear installations, including research reactors, are established in GSR Part 2 [~~13~~14] ~~INTERNATIONAL ATOMIC ENERGY AGENCY, Establishing the Safety Infrastructure for a Nuclear Power Programme, IAEA Safety Standards Series No. SSG-16 (Rev. 1), IAEA, Vienna (2020).~~	Editorial and unappropriate refference.	X			

			~~4.1. [1414]~~, including the requirement for the management system to be developed and applied using a graded approach.					
71.	USA 10	4.1	Remove reference to SSG-16 and “[1414]”	Apparent incorrect reference	X			
72.	Indonesia 10	4.2/1	The operating organization for a research reactor facility shall have the prime responsibility for the safety of the research reactor over its lifetime, from the beginning of the project for site evaluation, design, construction, commissioning, operation, including utilization and modification, and decommissioning, until its release from regulatory control.Furthermore,,Para 4.1 of SSR-3 [1]. ~~Paragraph 4.1 of SSR-3 [1] states:~~				X	Requirement paras is stated in safety guides.
73.	Egypt 21	4. 7 / item (a)	(a) Type , duration and content of training;	the term duration illustrate the level of complexity of training	X			
74.	Japan 16	4.8./1	Procedures for a research reactor ~~with a high potential hazard~~ should be subject to a level of review and approval commensurate with their	There is no reason to restrict to a research reactor with a high potential hazard, as stated “commensurate with their safety significance” in	X			

			safety significance. A procedure for a simple maintenance task on a component in a non-active system with low safety significance.	the last part of this sentence.				
75.	Egypt 22	4.10	Paras 2.37–2.44 of GS-G-3.1 [~~1~~15] also provide…..	Typo error	X			
76.	Belgium 7	4.10	4.10. Paras 2.37–2.44 of GS-G-3.1 [1~~1~~5] also provide recommendations	Typographical correction ([115] does not exist. Moreover, [15] is mentioned twice in the reference list (see General comment).	X			
77.	Japan 17	4.11./1	The requirement for the assessment and improvement of the integrated management system can be applied using a graded approach to identify and correct weaknesses commensurate with their safety significance, and with the potential hazard of the facility. For example, for a research reactor with a high potential hazard, the operating organization could be large, and the management system could include a large number of procedures to ensure operation, utilization and maintenance activities are	There are no recommendations in this paragraph. Two sentences are suggested to be modified into 'should" statements. If this modification is not suitable, whole sentences should be deleted, as relevant recommended practices are described in para 4.10, which refer paras 2.37–2.44 of GS-G-3.1. The same reason as general comment #2.	X			

			conducted safely. An operating experience programme ~~could~~ should be implemented by a small group of personnel within the operating organization to identify weaknesses and improvements in the management system on a weekly basis, for management to prioritize based on their safety significance. In parallel, the management system ~~could~~ should be the subject of frequent external assessment, to identify where systemic improvements can be made. For a research reactor with a low potential hazard, the management system could consist of relatively few processes and procedures, the operating experience programme could be implemented by the operations personnel to identify improvements to the management system, and an audit of the management system could occur as part of the renewal of the authorization from the regulatory body.					

78.	Japan 18	4.12./1	Requirements for safety assessment are established in Requirement 5 of SSR-3 [1]. This requirement can be applied using a graded approach, for example by considering the potential hazard of the research reactor when determining the frequency and scope of safety assessments throughout the lifetime of the facility such as self-assessments and peer reviews. ~~For example, t~~The frequency and scope of safety assessments, self-assessments and peer reviews, should be commensurate with the potential hazard of the facility, recent operating experience, the potential hazard of modifications (see para 7.70), or the results from previous periodic safety reviews.	It is not preferable to include "should" statement in "for example" statement. The "should" statement comes first without any restriction, and then, "for example" statement comes in order to show real practices that can apply "should" statement. The same reason as general comment #2.	X			
79.	USA 11	4.12	…(see paras 7.70-7.75)…	Other paragraphs include relevant information	X			
80.	Indonesia 11	4.12/1						

81.	Indonesia 12	4.14						
82.	Japan 19	4.14./6	A minimum list of items that the safety committee is required to review is provided in para 4.27. of SSR-3 [1] (see also para 7.9 of this Safety Guide).	Userfriendliness.	X			
83.	Israel 2	4.15 and 7.7b	Referring to Reactor Safety Committees, these paragraphs include membership composition as an aspect to which graded approach can be applied. We suggest to emphasize in those paragraphs that such approach should be subject to restrictions of functional independence (between committee members and reactor management).	completeness	X			Already covered in para 4.14 of the safety guide.
84.	Japan 20	4.16./1	In a research reactor with a high potential hazard, the safety committee could have a busy schedule of work, requiring frequent meetings reviewing	This paragraph also does not include any recommended practices. Therefore, one statement is suggested to be "should" statement to make this paragraph include	X			

			proposed experiments of safety significance, safety documentation, reports on doses to personnel and reports to the regulatory body. In such a research reactor, the safety committee may designate subcommittees with specific expertise to provide advice or recommendations on specific technical areas such as criticality safety or radiation protection, to reduce the workload on other safety committee members. The composition of the safety committee and its subcommittees typically should includes a wide range of expertise on all technical areas of operation. The operating organization for such a facility typically can staff the safety committee from internal personnel. In a research reactor with a low potential hazard, the safety committee could be convened less frequently to review the status of safety and to provide advice to the reactor manager, with additional meetings arranged only as	recommendation. Otherwise, the whole paragraph should be deleted. The same reason as general comment #2.				

			necessary. The operating organization for such a research reactor is typically smaller in size, and the safety committee could be staffed with a number of external personnel with experience from other facilities and in the appropriate technical areas.					
Section 5								
85.	Belgium 8	5.1	The requirements for site evaluation for research reactors are established in IAEA Safety Standards Series No SSR-1, Site Evaluation for Nuclear Installations **[15].** Recommendations for the application of those requirements for research reactors, using a graded approach, are provided in Section 6 of IAEA Safety Standards Series No. SSG-35, Site Survey and Site Selection for Nuclear Installations, **[16].**	References [15] and [16] are the “second” [15] and [16] in the list of references. To be corrected.	X			

86.	Egypt 23	5.1	The requirements for site evaluation for research reactors are established in IAEA Safety Standards Series No SSR-1, Site Evaluation for Nuclear Installations [19] ~~[15].~~ Recommendations for the application of those requirements for research reactors, using a graded approach, are provided in Section 6 of IAEA Safety Standards Series No. SSG-35, Site Survey and Site Selection for Nuclear Installations, [20]~~[16].~~	The correct reference citation numbers as in the references section is added	X			
87.	USA 12	5.2	For example, a conservative ~~assumption for the~~ design of a particular SSC that is readily accommodated...	Clarity.	X			
88.	Libya 9	5.3	(f) The need for active systems and/or operator actions for the prevention of accidents and ~~for~~ the mitigation of the consequences of accidents;	Improved clarity.	X			
89.	Libya 10	5.4	The requirements for site evaluation should be applied to use a graded	Improved grammar.		X		See resolution to USA comment 13 on same para.

			approach, provided that there is an adequate level of conservatism in the design and siting criteria, to compensate for a simplified site hazard analysis and simplified analysis methods.					
90.	USA 13	5.4	The requirements for site evaluation should be applied useing a graded approach… Delete second comma between "criteria" and "compensate"	Clarity and grammar.		X		The text modified after technical editorial review.
91.	Japan 21	5.4./L1	~~The~~ In applying a graded approach to the requirements for site evaluation ~~should applied use a graded approach, provided that~~ there ~~is~~ should be an adequate level of conservatism in the design and siting criteria, to compensate for a simplified site hazard analysis and simplified analysis methods.	Application of a graded approach to site evaluation is established in SSR-1, therefore, it is suggested to describe recommended practices in applying a graded approach. The same reason as general comment #1.		X		See resolution to USA comment 13 on same para.

92.	Japan 22	5.5./L1	Section ~~10~~ 9 of IAEA Safety Standards Series No. SSG-9 (Rev. 1), Seismic Hazards in Site Evaluation for Nuclear Installations [17] provides recommendations on a graded approach to the application of safety requirements for seismic hazard evaluation for nuclear installations other than nuclear power plants. The approach can be based upon the complexity of the installation and the potential radiological hazards, including hazards due to other materials. A seismic hazard assessment should initially apply a conservative screening process in which it is assumed that the entire radioactive inventory of the installation is released by an accident initiated by a seismic event. If such a release would not lead to unacceptable consequences for workers, the public or the environment, the installation may be screened out from further seismic hazard assessment. If the results of the	1) Please clarify difference between seismic hazard evaluation and seismic hazard assessment. DS507 (revision of SSG-9) uses the term "seismic hazard assessment" and does not use the term "seismic hazard evaluation" throughout the draft. 2) Please clarify "hazards due to other materials".		X 'Section ~~10~~ 9 of IAEA Safety Standards Series No. SSG-9 (Rev.1), Seismic Hazards in Site Evaluation for Nuclear Installations provides recommendations on a graded approach to the application of safety requirements 15 of SSR-1 [20] for the evaluation of the seismic hazard for nuclear installations other than nuclear power plants. The approach can be based upon the complexity of the installation and the potential radiological hazards, including hazards due to other materials e.g. the presence of flammable, explosive, or toxic materials. ……. If the results of the		For consistency with SSG-9 (Rev.1).

			conservative screening process show that the potential consequences of such a release could be significant, a seismic hazard evaluation should be performed.			conservative screening process show that the potential consequences of such a release could be significant, an evaluation of seismic hazard is required to be performed in accordance with Section 5 of SSR-3 [1].’		
93.	Egypt 24	5.5-5.7	All references numbering in para 5.5-5.7	Reference citation number needs to be corrected according to the modified references section	X			
94.	Japan 23	5.7./4	For the purpose of the evaluation of meteorological and hydrological hazards, including flooding, the installation should be screened on the basis of its complexity, the potential radiological hazards, and hazards due to other materials.	Please clarify “hazards due to other materials”. The same comment as #22-2).		X should be screened on the basis of its complexity, the potential radiological hazards, and hazards due to other materials e.g. the presence of flammable, explosive, or toxic materials.		For clarity
95.	Belgium 9	5.7	… If the results of a conservative screening process, similar to that	References [17] and [18] are the “second” [17] and [18] in the list of references. To	X			

			described in SSG-9 (Rev. 1) **[17]** and SSG-21 **[18],** …	be corrected.				
96.	Belgium 10	5.8	Recommendations on site survey and site selection, including the screening and analysis of human induced events, are provided in SSG-35 **[20].** While the events themselves are discrete, the siting process for nuclear installations other than nuclear power plants can be applied using a graded approach, based on the potential hazard of the facility (see Section 6 of SSG-35 **[20])**	References [20] is the "second" [16] in the list of references. To be corrected.	X			
97.	Japan 24	5.8./1	Human induced events cannot be included in site evaluation using the same approach as other external events. Because human induced events are discrete and are not characterised by a range of frequency and severity, only one intensity level for each event is expected for consideration in the design basis. Recommendations on site survey and site selection, including the	Section 6 of SSG-35 does not show any recommendations in addressing <u>human induced events</u> in site evaluation. Also, SSG-35 itself shows only general aspects of addressing human induced events and does not show any specific recommendation on human induced events in site evaluation.		X For the evaluation of hazards associated with human induced events in site evaluation for a research reactor, only one intensity level for each event is expected to be considered in the design basis. Recommendations		Relevant reference is quoted after technical editorial review.

			screening and analysis of human induced events, are provided generally in SSG-35 [20]. ~~While the events themselves are discrete, the siting process for nuclear installations other than nuclear power plants can be applied using a graded approach, based on the potential hazard of the facility (see Section 6 of SSG-35 [20])~~			on the screening and analysis of hazards associated with human induced events are provided in IAEA Safety Standards Series No. DS520, Hazards Associated with Human induced External Events in Site Evaluation for Nuclear Installations		
98.	USA 14	5.8	Replace entire paragraph with: While not specific to nuclear installations other than nuclear power plants, SSG-35 [XX] includes general recommendations for the screening and analysis of human induced events in site survey and selection. The specific recommendations in Section 6 of SSG-35 [XX] can be used in applying a graded approach to the evaluation of human induced events (as well as other external events) in the siting process for nuclear installations other than nuclear power plants.	Eliminate repetition and more clearly indicate that SSG-35, Section 6, can be used in grading analysis related to human induced events, and provide an example. Also, the basis of the first 2 sentences (of current para 5.8) is unclear. It is not clear that it is correct in all cases that human induced events are not characterized by a range of frequency and severity. For example, there could be a range of frequency and severity of aircraft crash events based on site location with respect to a nearby airport, and the		X		Modified the text please see response to Japan comment No. 24 on same para.

			For example, the potential aircraft crash hazard due to the proximity of a site to an airport may need to be analyzed in detail for a large, complex facility, but may not require much rigor for a small facility such as a critical or subcritical assembly with minimal overall hazard.	nature of activities at the airport (e.g., flights per day and type/size of aircraft).				
Section 6								
99.	Indonesia 13	6.1/1	6.1. The use of a graded approach in the design of research reactors are referring to section 6 of SSR-3 [1] establishes requirements for design under three categories: (a) Principal technical requirements; (b) General requirements for design; and (c) Specific requirements for design.	Rewrite Para 6.1 to simplify it and avoid repetition in DS511			X	For clarity of users.
100.	Libya 11	6.1	(b) General requirements for the design: Paragraphs 6.19–6.91 of this Safety Guide provide recommendations on the use of a graded approach in the application of Requirements 16–41 of SSR-3 [1].	Improved grammar.	X			

101.	Japan 25	6.2./7	The use of a graded approach should result in design features which fully meet this requirement and are appropriate for responding the potential hazard from the research reactor.	Better expression.		X		The text modified after technical editorial review.
102.	USA 15	6.3(c)	Confinement of radioactive material, shielding against radiation and control of planned radioactive releases, as well as limitation of accidental radioactive releases:	Make the para 6.3 list comprehensive and consistent with Req. 7 of SSR-3, and make 6.3(c) consistent with the content in 6.3(c)(i).	X			
103.	USA 16	6.3(c)(ii)	The design of shielding for protection from radiation should be based on the magnitude of the radiation hazard which can be calculated for each location in the research reactor where actions by operating personnel are necessary in operational states and in accident conditions, and for appropriate locations outside the reactor facility.	Shielding may need to be considered to limit radiation levels outside the facility as well.	X			
104.	Pakistan 3	Section 6.3 (c)(iii) / Page 24 & Section 6.140/Page 52	Section 6.3 of DS states that the requirement for the control of planned radioactive discharges cannot be applied using a graded	There is a contradiction in between both clauses/sentences. The same may be harmonized/justified.		X The control of planned radioactive discharges is required for all		'Control' itself is required but the way that this control is applied can be graded as

			approach. However, section 6.140 states A graded approach can be used in the application of the requirements for the handling, processing, storage, transport and disposal of radioactive waste, and **for control and monitoring of solid, liquid and gaseous effluent discharges**, based on the characterization, types and quantities of radioactive waste generated in the research reactor facility.			research reactors regardless of their potential hazards.		described in 6.140.
105.	Japan 26	6.4.	**Radiation protection** Requirements for radiation protection in the design of research reactors are established in Requirement 8 of SSR-3 [1]. The requirement for the design to ensure that doses to reactor personnel and the public are kept as low as reasonably achievable ~~should~~ <u>may</u> be applied using a graded approach considering the potential hazard of the research reactor, ...	SSR-3 states in para 2.16. that *"Most research reactors give rise to fewer potential hazards to the public than nuclear power plants, but they may pose <u>greater potential hazards</u> to operators, researchers and other users owing to the relative ease of access to radiation or radioactive materials."* As such, careful discussions needed to apply a graded approach to radiation protection. Therefore, application of a graded approach is not recommended practice, but		X The requirement for the design to ensure that doses to reactor personnel and the public are kept as low as reasonably achievable inherently implies the use of a graded approach in which the potential hazard of the research reactor, and its characteristics such as the inventory of fission products and		The text modified after technical editorial review.

				acceptable practice. The same reason as general comment #2.		the proximity to a population centre are also taken into account		
106.	Indonesia 14	6.4/2						
107.	Japan 27	6.5./1	Requirements for the design of a research reactor are established in Requirement 9 of SSR-3 [1]. ~~The use of a graded approach in the application of this requirement should be based on the potential hazard of the facility and the factors in para. 2.9.~~	Delete second sentence, as it states just prerequisite to apply a graded approach and reference to para 2.9, which is not recommended practice. Some paragraphs, such as paras 6.23, 6.26. 6.28, and so on, have only simple one sentence, saying "Requirements for xxx are established in Requirement YY of SSR-3 [1]." The same reason as general comment #2.			X	See resolution to Japan comment No. 2.
108.	Japan 28	6.8./L2	However, in applying a graded approach to this requirement ~~should be applied using a graded approach by~~ it should be recognized ~~recognizing~~ that for low power research reactors, or critical and subcritical assemblies, accidents which need mitigation by the fourth or fifth level of defence in depth (see para.	It would be preferable to describe recommended condition to apply a graded approach. The same reason as general comment #1.		X		The paragraph text is modified after technical editorial review.

			2.12 of SSR-3 [1]) may not be physically possible.					
109.	Japan 29	6.10./L5	This requirement is specifically for integration, and consequently it cannot be applied using a graded approach . ~~The design of the safety measures themselves are the subject of specific requirements of SSR-3 [1], and these requirements should be applied using a graded approach commensurate with the potential hazard of the facility.~~	This message is not any relation to interfaces of safety with security and the State system of accounting for, and control of, nuclear material.	X			
110.	Japan 30	6.12./L3	~~A~~In applying a graded approach ~~can be used in the application of~~ to this requirement,~~ based on~~ those element, such as the potential hazard of the facility, the safety classification of the SSC, and the availability of related codes and standards~~,~~ such as those for nuclear power plants or from other industries should be taken into accout.	To make this paragraph recommended practicable activities. The same reason as general comment #1.			X	See resolution to Japan comment No. 1.
111.	Japan 31	6.17./L1	The choice of materials used in the design of a research reactor should use	The message "to be commensurate with potential hazards" is		X		As per USA comment No 17 on

			engineering judgement to address the utilization needs of the facility and the hazards in the decommissioning process that result from long-lived activation products. ~~The effort and scope of design measures to minimize radioactive waste from decommissioning the research reactor should be commensurate with the potential hazard of the decommissioning process.~~	prerequisite to apply a graded approach, and then suggested to be deleted this sentence.				same para.
112.	USA 17	6.17	The choice of materials used in the design of the research reactor should use engineering judgement to balance ~~address~~ the utilization needs of the facility with the need for waste management and the hazards in the decommissioning process that result from long-lived activation products. The effort and scope of design measures to minimize radioactive waste generated during operation, or from decommissioning the research reactor, and to manage waste that is generated, should be	Suggested edits to more comprehensively address the SSR-3 Requirement 15. The Requirement is not just about choice of materials to minimize waste during decommissioning, but also about minimizing waste during operations, ensuring appropriate facilities to handle waste during operations, and minimizing overall effort and dose impacts during decommissioning.	X			

			commensurate with the potential hazard of the facility and potential for generation of activation products ~~decommissioning process~~. […] Planning for how activated ~~those~~ materials or waste are managed during the operating lifetime and the decommissioning of the facility should include radiation protection considerations and could include specific technology or practices to prevent undue radiation exposure of personnel. For example, it may be necessary to include special processing and storage facilities to manage waste generated during operation. Also, the facility could be designed so that any highly activated materials can be easily accessed and removed during decommissioning, to minimize exposure. For a research reactor with a low potential hazard….					
113.	Japan 32	6.20./L2	The method for determining the safety significance of SSCs ~~should~~ is required to be	This message is not recommendation, but requirement in para 6.29 under Req. 16 of SSR-3,	X			

			based on deterministic methods, complemented by probabilistic methods and may be supported by engineering judgement.	which states that "The method for classifying the safety significance of items important to safety shall be based primarily on deterministic methods complemented, where appropriate, by probabilistic methods (if available). The same reason as general comment #2. Meanwhile, engineering judgement plays supporting role.				
114.	Japan 33	6.22./L1 6.32./L1	6.22 Although it is not possible to apply the requirements in para 6.34 of SSR-3 [1] using a graded approach, the design basis for items important to safety in a research reactor or a critical or subcritical assembly with a low potential hazard, is typically less complex, and requires less analysis to demonstrate that its performance meets acceptance criteria, due to the low potential hazard of the facility. The classification of SSCs, based on their importance to safety, should be utilized to establish the	Please clarify difference between "acceptable limits" and "authorized limits" in this draft.	X			Defined in IAEA glossary which is referred in the safety guide.

			design requirements for withstanding accident conditions without exceeding authorized limits. 6.32. One aspect of this requirement that can be applied using a graded approach is the degree of conservatism included in design limits. The specification of design limits should include conservatism to ensure ... and that the facility will withstand design basis accidents without acceptable limits for radiation protection being exceeded.					
115.	Japan 34	6.34./L1	~~The~~ In applying a graded approach to requirement to derive a set of design extension conditions, ~~should be applied using a graded approach based on~~ those elements such as the potential hazard of the research reactor, engineering judgement and the results of the safety analysis of design basis accidents should be taken into account.	Clarification of recommended practices. The same reason as general comment #1.		X In applying a graded approach to ~~requirement to derive~~ the derivation of a set of design extension conditions, the potential hazard of the research reactor, engineering judgement and the results of the safety analysis for design		For clarity.

						basis accidents should be taken into account		
116.	USA 18	6.34	The outcome from the analysis of these design extension conditions could result in additional design features in combination with an additional set of severe accident management procedures to complement other ~~the existing~~ emergency plans and procedures.	Clarity and grammar.		X		The text is modified after technical editorial review.
117.	Japan 35	6.36./L1	For each design basis accident and <u>selected design extension conditions</u>, the safety analysis for the facility is required to demonstrate that operational parameters are maintained within the specified design limits by either passive or engineered safety features.	Clarify "<u>selected</u> design extension conditions" in relation to para. 6.34, which states all DECs, not selected DECs, have already been derived applying graded approach.		X ' For each design basis accident ~~and selected design extension conditions~~…'		Revised in line with USA comment 19 on same para.
118.	USA 19	6.36	For each design basis accident ~~and selected design extension conditions~~, the safety analysis…	"Selected" is vague. Also, SSR-3 Requirement 23 is limited to design basis accidents.	X			
119.	USA 20	6.38	Evaluation of t~~T~~he reliability of items important to safety…	Clarity.		X		Text is modified after technical specialist review.
120.	USA 21	6.39	…ensure a high reliability~~.~~, but i~~I~~f greater reliability is needed…	Suggest merging sentences for clarity.	X			

121.	USA 22	6.40	Depending on the type of design basis of the research reactor, performance of one or more of the following safety functions may need to be automatic:	The type of research reactor does not determine whether a safety function may need to be automatic.	X			
122.	USA 23	6.41	To ensure the necessary reliability one or more of the following design principles… …are provided in paras 6.42-6.5~~1~~0.	It may be appropriate to use more than one of these. Cross-reference appears to be incorrect.	X			
123.	USA 24	6.43	…are required to be designed with appropriate redundancy, independence and diversity to ensure high reliability.	Not necessarily required to have all 3 of these for every system, if it isn't needed to ensure adequate reliability.	X			
124.	Egypt 25	6.46	Requirements for the physical separation and independence of safety systems can be applied using a graded approach. Physical separation can be incorporated into a design to varying degrees, ...	The addition of this statement is needed for more clarification		X Requirements for the physical separation and independence of safety systems are established in requirement 27 of SSR-3 <u>and can be applied using a graded approach.</u>		To avoid duplication of text, addressed in para 6.45.
125.	Japan 36	6.48./L1	The requirement for the use of fail-safe design features cannot be applied using a graded approach. However engineering judgement ~~should~~ <u>could</u> be	It is not possible to recommend any practices for the requirement which a graded approach cannot be applied. If possible, it will be some exceptions, which			X	The recommendation is not on using engineering judgement on the requirement for

			applied, considering the acceptance criteria used in the safety analysis of the design, to assess the appropriate extent of fail-safe design features in systems and components important to safety, to ensure that safety functions are sufficiently reliable in response to initiating events to prevent and mitigate design basis accidents and selected design extension conditions.	are not actively recommended, but may be adopted. Use of engineering judgement should be carefully discussed here. The same reason as general comment #2.				fail safe design features. However, it is related to the assessment of the appropriate extent of fail-safe design features in systems and components important to safety
126.	Egypt 26	6.50	Requirements for the qualification of items important to safety can be applied using a graded approach. Where the design of a research reactor includes provisions for safety functions to mitigate..........	The addition of this statement is needed for more clarification		X		The text is modified after technical editorial review..
127.	USA 25	6.53	Requirements for design to accommodate ~~for~~ the calibration…	Better consistency with topic of SSR-3 requirement 31	X			
128.	USA 26	6.56	The design of a research reactor is required to accommodate the need for maintenance and testing of components at appropriate intervals following initial	If "required" is being used here, should be clearer that testing during operation is not necessarily needed for all facilities. Testing during shutdown periods following		X The design of a research reactor ~~is required to~~ should accommodate the need for		For consistency with SSR-3.

			commencement of operation, which could include provisions for maintenance and testing during operation, based on the reliability requirements… …the reliable performance of SSCs in the reactor protection system may be able to ~~could~~ be adequately demonstrated with…	commencement of operation may be enough for most facilities. Some low hazard facilities might still need to accommodate testing of SSCs during operation.		maintenance and testing of components during operation…..		
129.	USA 27	6.58(b)	These provisions may include accessibility….	List may not be exhaustive, and also every item will not always be needed.	X			
130.	USA 28	6.63(a)	The need for disposal facilities for high level radioactive waste will~~,~~ ~~therefore,~~ likely be minimal.	The second sentence of 6.63(a) does not appear to follow from the first sentence, but appears instead to be a different point.	X			
131.	USA 29	6.65	…and new experimental devices and design activities in preparation for decommissioning.	Suggested revision for clarity.	X			
132.	Japan 37	6.69./L1	Requirements for radiation protection (see para 6.4) and radioactive waste management (see para 6.16–6.18) at research reactors can also be	The term of "authorized limit" is preferred rather than "prescribed limit" in accordance with the Safety Glossary.		X '….the objective of maintaining doses below authorized ~~dose~~ limits and ….'		Consistent with IAEA glossary.

			applied using a graded approach and contribute to the objective of maintaining doses below ~~prescribed~~ authorized dose limits and as low as reasonably achievable.					
133.	Egypt 27	6.75	Technical guidelines on managing the interface between nuclear safety and security for research reactors are provided in ~~Ref. **Error! Reference source not found.**].~~	It needs to add the correct reference citation number	X			
134.	Belgium 11	6.75	… Technical guidelines on managing the interface between nuclear safety and security for research reactors are provided in Ref. **Error! Reference source not found.].**	To be corrected by IAEA	X			
135.	Canada 3	6.75	Broken reference link	Draft TECDOC on “Application of a graded approach in regulating nuclear power plants, research reactors and fuel cycle facilities” contains a methodology for the application of a graded approach. This will be applicable to research reactors as well. This should be incorporated by		X		The correct reference is provided.

				references into DS511 – especially in Chapter 2.				
136.	Israel 3	6.75	Paragraph 6.75 is part of the text dealing with general requirements for design related to provision for safe utilization and modification in research reactors. Therefore, referring to requirement **90** of SSR-3 (instead requirement **83** apparently) and the inclusion (in this paragraph) of the sentence: "*Technical guidelines on managing the <u>interface between nuclear safety and security</u> for research reactors are provided in…*", have to be of cause corrected.	clarity		X <u>Para 9.6 of</u> ~~Requirement 90 in~~ SSR-3 [1] includes……		Relevant para of SSR-3 is referred.
137.	USA 30	6.75	Fill in missing reference (TECDOC-1801?)	Missing reference.	X			
138.	USA 31	6.81	…provision should be made for	Not every item in this list will be necessary.	X			

			inspecting~~inspection~~, testing, maintaining, dismounting and/or disassembling, as appropriate, during the shutdown period.					
139.	USA 32	6.81 Line 5	Change: It may be more convenient to remove equipment than to implement a preservation programme with the equipment in place; this decision is usually linked to the future of the research reactor. To: As an alternative to implementing a preservation progamme for installed equipment, it may be more practical to remove the equipment; this decision is usually linked to the future of the research reactor.	Removal of installed equipment should not be based on convenience but have a rational basis.	X			
140.	Egypt 28	6.80 / 2, 6.81 / 2,4	It is proposed to use one expresion ”long shutdown” or ”extended shutdown”	both sever the same meaning			X	Footnote 48 of SSR-3 explains these terms.

141.	Egypt 29	The title before para 6.83	It is proposed to modify the title to be ”physical protection of, or interference with, items important to safety” instead of ”Prevention of unauthorized access to, or interference with, items important to safety”	The use of physical protection is more general than Prevention of unauthorized access			X	Consistence with SSR-3.
142.	USA 33	6.83	A major objective of access control, in addition to preventing sabotage, is to prevent…	Sabotage prevention should be mentioned somewhere in the para as this is also an important objective of SSR-3 Requirement 39.	X			
143.	USA 34	6.90 (MFB)	The safety analysis required for a ~~small~~ facility with a relatively small number of SSCs and applicable postulated initiating events would be simpler than that for a ~~large and~~ complex facility with many SSCs.	The approach to grading is linked to the potential hazard of the facility. Use of “small” and “large” appears to suggest size of the facility, which does not necessarily describe the potential risk of the facility.	X			
144.	Japan 38	6.91./L1	A graded approach is also required to be used in updating the safety assessment ~~(see para. 5.10 of GSR Part 4 (Rev. 1) [22])~~. The frequency at which the safety assessment is updated and the level of detail of the safety assessment should	Para. 5.10 of GSR Part 4 (Rev. 1) does not say anything of a graded approach, which states “The safety assessment shall be periodically reviewed and updated at predefined intervals in accordance with regulatory requirements. Periodic review may need to		X Paras. ~~5.10~~ 3.1-3.7 of GSR Part 4 (Rev. 1)..)….’		Correct para number is referred.

			be based on the following:	be carried out more frequently to take into account: (a) .... (d)".				
145.	USA 35	6.107	Cooling by natural convection might be adequate for some ~~small~~ low power research reactors.	Cooling adequacy is related to the method of heat removal and the power level of the reactor.	X			
146.	Japan 39	6.116./L1	~~A graded approach should be taken in~~ In determining the types of measurement, locations of measurement and number of measurements to be taken of reactor parameters, such as temperature, pressure, flow, pool or tank water level, gamma radiation, neutron flux and water chemistry parameters~~.~~, operational ~~Operational~~ limits and conditions should provide the basis for a graded approach ~~in the application of this requirement~~.	Applicability of a graded approach to I&C system is already explained in paragraph 6.114, and therefore, the recommendable actions in applying a graded approach should be described here. The same reason as general comment #1.	X			
147.	Japan 40	6.120./L9	In a research reactor with a lower potential hazard, natural convection cooling and no high-pressure experimental devices, care should be given in selecting ~~fewer~~ postulated initiating events ~~should be~~	Fewer postulated initiating events is not intentional target, and may be achieved after careful discussion in accordance with the nature of reactor type concerned.	X			

			applicable for the reactor protection system design and safety analysis, for example primary pump failure, or loop rupture for a fuel testing experimental device.					
148.	Japan 41	6.122. /L4	In systems important to safety where safety analysis has demonstrated that a loss of redundancy could exist for 24 hours and the system meets acceptable reliability targets, a daily function test should be performed to confirm the availability of each channel of instrumentation, and the design should support that level of testing. In a system with lower safety significance, the instrumentation and control equipment could be tested weekly or monthly and perform sufficiently reliably.	Assumption is seemed to be unrealistic. Please explain actual phenomenon that applies to this in detail.		X "In systems important to safety where safety analysis has demonstrated that a loss of redundancy could exist for ~~24 hours~~ a defined period of time and the system meets acceptable reliability targets, a ~~daily~~ function test should be performed at appropriate periodicity (e.g. daily) to confirm …..'		The sentence is rephrased to address the comment.
149.	Egypt 30	6.122	Requirements for the reliability and testability of instrumentation and control systems can be applied using a graded approach. In systems with high safety significance	The addition of this statement is needed for more clarification		X Addressed in para 6.121 as 'Requirements for the reliability and testability of instrumentation and		To avoid repetition, text is added at the end of para 6.121.

			such as a safety system in a research reactor with a high potential hazard,........			control systems are established in Requirement 51 of SSR-3[1] and can be applied using graded approach'		
150.	USA 36	6.125	In a research reactor with a high potential hazard, accident conditions identified in the safety analysis could involve combinations of severe conditions of radiation, chemicals, heat and humidity.	Hazardous chemicals could be released during an accident that may impact control room environment.	X			
151.	USA 37	6.126, 4th sentence	The use of a graded approach could affect, in particular, the location, the number of parameters to be monitored and controlled, and the actions necessary to maintain the reactor in a safe shutdown state, as well as, for example, information from radiation monitors, fire detection systems, and fire suppression systems in the research reactor, and emergency communication equipment.	Graded approach could be used to determine the location of the secondary control room. For example, a low potential risk facility could have the secondary control room within the same building as the facility. However, for a high risk facility, the secondary control may need to be located further away from the facility.	X			

152.	Pakistan 2	Section 6.141/ Page 53	…….A graded approach for the design of shielding in radioactive waste systems should be based on the characteristics and radiological hazard of the waste produced at the facility	The text may be shifted to section 6.140 or at any other relevant section as it seems irrelevant in this para i.e. transport safety.	X			
153.	Egypt 31	6.146	– this paragraph did not discuss the case of open pool reactor – Requirements for air conditioning systems and ventilation systems can be applied using a graded approach. For a research reactor with a high potential hazard, the design may include……..	– the release of Ar-41 from open pool reactor should be considered – The addition of this statement is needed for more clarification		X 'Requirements for air conditioning systems and ventilation systems are established in Requirement 64 of SSR-3 [1] and can be applied using a graded approach'		The existing text covers all conventional airborne radiological hazards including Ar-41. To avoid repetition, text is added at the end of first sentence of para 6.146.
154.	Egypt 32	6.150	Recommendations for a categorization process for experimental devices are provided in section 3 of DS509A [11]	The reference citation number [11] is not consistent with reference name DS509A	X			
Section 7								
155.	Libya 12	7.2	The general responsibilities and functions of the operating organization as well as	Improved grammar.	X			

			responsibilities, functions, and line of communications of the key positions within the reactor operation organization, apply equally to all research reactors regardless of their potential hazard.					
156.	Egypt 33	7.4 / 5,6	…ageing management, environmental monitoring, and utilization....etc.	other programs such as waste management is not considered		X ‘…..waste management and utilization’		IAEA style of writing.
157.	USA 38	7.9, 2nd sentence	A graded approach should be used in the application of this requirement with respect to the number of members ~~size~~ of the safety committee, including appropriate level and range of technical expertise and the frequency of meetings, based on the potential hazard and the utilization schedule of the facility, or the number and complexity of planned modifications with safety significance.	An appropriate area of grading is the level and range of technical expertise of the safety committee.	X			
158.	Egypt 34	7.13 / 3	could be subjected to use of a graded approach in	Editorial correction	X			

			accordance with					
159.	Libya 13	7.17	Since the operational limits and conditions are based on the reactor design and on the information from the safety analysis report concerning the conduct of operations, [...]	Improved grammar.	X			
160.	Pakistan 1	7.35	Prior to operation, a graded approach should have been used in the application of the requirements for research reactor design, construction, **commissioning** and safety analysis.	Before operation, graded approach is also applied during commissioning phase.	X			
161.	Japan 42	7.32/L11.	A graded approach to testing should be adopted (see Para. A.2 of the Appendix of DS509A [2]). The extent and type of tests to be performed should be determined on the basis of the importance to safety of each item and the potential hazard of the reactor. ~~Further recommendations on use of a graded approach in application of safety requirements on commissioning are~~	Any further recommendations are not provided in DS509A, which states quite the same message as in this draft. *(DS509A) A.2. The commissioning programme usually includes tests for all SSCs of the research reactor facility. For this purpose a graded approach to testing should be adopted, the extent and type of tests to be performed being determined on the basis of the importance to safety of each item and the overall hazard potential of the research*			X	Covered in other paras such as 3.6 and 3.11 of DS509A.

			~~provided in DS509A [2].~~	*reactor*.				
162.	Japan 43	7.37.L1	All personnel using operating procedures are required to be thoroughly familiar with them and proficient in their use. However, a graded approach ~~should~~ could be used in application of the requirement for personnel to be adequately trained in the use of operating procedures. For personnel to be adequately trained in the use of operating procedures.	Training of operational personnel in the use of operating procedures is essential, but some procedures for the facility with less potential risk might be reduced in the contents of training. In this context, this is not recommendation. The same reason as general comment #2.	X			
163.	Canada 1	7.43	"… For a facility with a low potential hazard and fewer SSCs important to safety, these activities can be performed by the qualified operating personnel, but a dedicated maintenance group is typically needed for a large research reactor facility with more SSCs and a high potential hazard."	This is a requirement of IAEA SSR-3 Safety of Research Reactors, requirement 7.75. It is not properly captured elsewhere in this section.	X			
164.	Canada 2	744	"~~Three~~ Four aspects of Requirement 77 should be applied using a graded approach…"	Four items are listed under aspects: 1. the development of procedures,			X	'The frequency of maintenance, periodic testing and inspection' is

				2. the frequency of maintenance, 3. periodic testing and inspection, and 4. the work permit system used to implement these procedures.				one aspect. See para 7.72 of SSR-3.
165.	Israel 4	7.46	It seems (to this reviewer) that the phrasing: " *When maintenance, periodic testing or inspection of an SSC* ***is uncomplicated and*** *operating experience indicates a* ***high reliability of the SSC****, a review of the frequency*...", <u>is ambiguous</u>. If the maintenance/periodic testing/inspection are **uncomplicated** than they can be performed at relatively higher frequency, while if the SSC has a **proven high reliability** than there is no need for high	clarity		X		Text modified after technical editorial review.

			frequency maintenance/periodic testing/inspection. So, I would like to suggest to rephrase the first part of this paragraph, or at least not to use the word ***and*** at its present location.					
166.	Egypt 35	7.57	Recommendations for fire safety are provided in ~~IAEA Safety Standards Series No.~~ DS503 [31], ~~Protection against Internal and External Hazards in the Operation of Nuclear Power Plants [26]~~ and ~~IAEA Safety Standards Series No.~~ DS494 [31], ~~Protection Against Internal Hazards in the Design of Nuclear Power Plants [27].~~	No need to mention the details of the reference and the reference citation number needs correction			X	Consistent with IAEA style of writing references.
167.	Egypt 36	7.59	.... and which should be periodically reviewed and updated (see DS503 ~~[26])~~ [31],~~.~~	The reference citation number needs correction	X			
168.	Egypt 37	7.62 / 1	It is proposed to introduce a defintion in the footer of the page for" non-radiation-related safety" as "non-radiation-related safety concerns hazards	the article without defintion is not clear			X	Already explained in SSR-3 footnote 45.

			other than radiation related hazards. This is sometimes refered to as industrial safety or conventiomal safety"					
169.	Egypt 38	7.63- 7.65	GSR Part 7 ~~[23]~~[28]),	The reference citation number needs correction	X			
170.	Egypt 39	7.68	and recommendations are provided in paras 5.35–5.49 of GS-G-3.1 ~~[115]~~ [15].	The reference citation number needs correction	X			
171.	Egypt 40	7.69	Consistent with the purpose for which reports are prepared and records are kept, para. 2.44 of GSG-3.1 ~~[1]~~[15]	The reference citation number needs correction	X			
172.	Israel 5	7.71	We suggest to add to this paragraph, (dealing with the requirement from the operating organization to establish criteria for categorizing a proposed experiment or modification in accordance with its importance to safety and use the resulting categorization to determine the types and extent of the analysis	completeness			X	Such detail is covered in relevant safety guide DS510B that is already referenced.

			and approvals to be applied to the proposal) the following: **These criteria have to be approved by the Regulatory Body.**					
173.	Egypt 41	7.76	Radiation protection requirements are also established in IAEA Safety Standards Series No. GSR Part 3, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards ~~[28]~~ [31]	The reference citation number needs correction	X			
Section 8								
174.	Indonesia 15	8.1/1	Requirements for the preparation for decommissioning of research reactor are established in requirement 89 of SSR-3 [1].	Rewrite Para 8.1 to simplify it			X	Consistent with the rest of the document.
Section 9								
175.	Indonesia 16	9.1	Requirements for the interfaces between safety and security for research reactor are established in requirement 90 of SSR-3	Rewrite Para 9.1 to simplify it			X	Consistent with the rest of the document.

			[1]					
References								
176.	Belgium 1	References	The list of references at the end of the document should be reconsidered attentively.	After a first series of [15] till [18], a second group of references [15] till [18] (with other documents compared to the first group) is given. This causes a lot of "wrong" references in the document. A few examples are given hereafter (but it is certainly not exhaustive).	X			
177.	Japan 44	Main body and RFERENCES	Missing number in REFERENCES and in the main body. ~~[15]~~[19] INTERNATIONAL ATOMIC ENERGY AGENCY, Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No. SSR-1, IAEA, Vienna (2019). ~~[16]~~[20] INTERNATIONAL ATOMIC ENERGY AGENCY, Site Survey and Site Selection for Nuclear Installations, IAEA Safety Standards Series No. SSG-35, IAEA, Vienna (2015). ~~[17]~~[21] INTERNATIONAL ATOMIC ENERGY AGENCY, Seismic Hazards in Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No. SSG-9 (Rev. 1), IAEA, Vienna (in preparation). ~~[18]~~[22] INTERNATIONAL ATOMIC ENERGY AGENCY, Volcanic Hazards in Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No.		X			

			SSG-21, IAEA, Vienna (2012). ~~[19]~~[23] INTERNATIONAL ATOMIC ENERGY AGENCY, WORLD METEOROLOGICAL ORGANIZATION, Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No. SSG-18, IAEA, Vienna (2011). ~~[20]~~[24] INTERNATIONAL ATOMIC ENERGY AGENCY, The Management System for Nuclear Installations, IAEA Safety Standards Series No. GS-G-3.5, IAEA, Vienna (2009). ~~[21]~~[25] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Analysis for Research Reactors, Safety Report Series No. 55, IAEA, Vienna (2008). ~~[22]~~[26] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Assessment for Facilities and Activities, IAEA Safety Standards Series No. GSR Part 4 (Rev. 1), IAEA, Vienna (2016). ~~[23]~~[27] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR ORGANIZATION, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, UNITED NATIONS OFFICE FOR THE CO-ORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015). ~~[24]~~[28] INTERNATIONAL ATOMIC ENERGY AGENCY, Regulations for the Safe Transport of				

			Radioactive Material, 2018 Edition, IAEA Safety Standards Series No. SSR-6 (Rev. 1), IAEA, Vienna (2018). ~~[25]~~[29] INTERNATIONAL ATOMIC ENERGY AGENCY, The Management System for the Safe Transport of Radioactive Material, IAEA Safety Standards Series No. TS-G-1.4, IAEA, Vienna (2008). ~~[26]~~[30] INTERNATIONAL ATOMIC ENERGY AGENCY, Protection against Internal and External Hazards in the Operation of Nuclear Power Plants, IAEA Safety Standards Series No. DS503, IAEA, Vienna (2000). ~~[27]~~[31] INTERNATIONAL ATOMIC ENERGY AGENCY, Protection against Internal Hazards in the Design of Nuclear Power Plants, IAEA Safety Standards Series No. DS494, IAEA, Vienna (in preparation). ~~[28]~~[32] EUROPEAN COMMISSION, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR ORGANIZATION, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, WORLD HEALTH ORGANIZATION, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna (2014).					
178.	USA 40	References	Renumber references	Ref. numbers [15] though [18] are each used twice in the reference list	X			

Contributors to drafting and review								
179.	USA 39	Contributors to drafting and review	Add: Waldman, R. (Argentina), and Helvenston, E. (U.S. Nuclear Regulatory Commission) Add: "Consultant, Israel" for Barnea, Y. affiliation	Participants in 12/2019 CM on DS511/SSG-22	X			