Comment No.	Safety Standards Review Committee	Country/ Organization	Country Comment No.	Sec.	Para/Line No.	Other Info.	Relevance	Proposed new text	Reason	Accept	Accepted, but modified as follows	Reject	Reason for modification/rejection
1	NUSSC	Germany	11	1	1			This Safety Guide is a revision of IAEA Safety Standards Series No. SSG-22, Use of a Graded Approach in the Application of the Safety Re-quirements for Research Reactors1, which it supersedes. It provides rec-ommendations on the use of a graded approach in the application of the safety requirements for research reac-tors, including critical and subcritical assemblies, established in IAEA Safe-ty Standards Series No. SSR-3, Safety of Research Reactors [1]. Homogeneous reactors and accelerator driven systems are out of the scope of this publication.	To be consistent with SSR 3, para 1.8		X Added to a new para 1.8 in SCOPE "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 text is consistent with the other 10 Safety Guides for research reactors being revised under DS509 and DS510
2	EPReSC	Iran	1	1	1			"This Safety Guide is a revision of IAEA Safety Standards Series No. SSG-22, Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors1, ~~which it supersedes.~~ "	Editorial		X The text now reads, "This Safety Guide supersedes the IAEA Safety Series…"		Standard text used in the other research reactor Safety Guides recently revised.
3	NUSSC	Germany	12	1	2			For the purpose of this Safety Guide, a graded approach is the application of safety requirements commensurate ~~with the characteristics of the facilities~~ and with the associated risks. The use of a graded approach is intended to ensure that the necessary levels of analysis, documentation and actions are commensurate with, for example, the magnitudes of any radiation haz-ards, the nature and considering the particular characteristics of a facility, and the stage in the lifetime of a fa-cility.	We agree that the during the grading the characteristics will be implicitly considered. However, the main reason is to balance the stringency of regulatory requirements with the associated risk, i.e. the hazard potential. The deletion will also be more consistent with SSR-3 and the methodology described in Section 3 of this safety guide.	X			
4	NUSSC	Germany	13	1	5			This Safety Guide provides recommendations for the use of a graded approach to the application of the safety requirements for research reactors, which are established in SSR-3 [1], without compromising safety. 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 for decommissioning of research reactors.	To combine paras 1.5 and 1.6 and to avoid presenting the same information twice.	X			
5	NUSSC	France	1	1	6			This Safety Guide presents recommendations on the use of a graded approach to the application of safety requirements for research reactors in SSR-3 [1], ~~without~~ which implies not compromising safety.	It should be clear that not compromising safety shall be intrinsic to graded approach		X text now reads, "This Safety Guide presents recommendations on the use of a graded approach to the application of safety requirements for research reactors in SSR-3 [1], all without compromising safety"		It is important to make this statement very clear. "implies" is not strong enough however.
6	NUSSC	Germany	14	1	6			~~This Safety Guide presents recommendations on the use of a graded approach to the application of safety requirements for research reactors in SSR-3 [1], without compromising safety.~~ This Safety Guide describes a meth-odology to categorize a research reactor facility and to analyse and apply a graded approach on the requirements given in SSR-3 [1].	To combine paras 1.5 and 1.6 and to avoid presenting the same in-formation twice. New para proposed to address the description of the methodology in section 2.			X	The text in para 1.1 provides an introductory statement
7	NUSSC	USA	1	1	7			…set out in para 2.2 of SSR-3 [1], the protection of people and the environment from harmful effects of ionizing radiation, is achieved.	Not clear what the "fundamental safety objective" is without having to go to the reference.	X			
8	NUSSC	France	2	1	8			All requirements are applicable to all types of research reactor, shall be implemented and cannot be waived. Guidance is provided in this Safety Guide on whether and how the application ~~implementation~~ of the requirements in SSR-3 [1] can be ~~applied~~ ~~using~~ ~~a~~ graded ~~approach~~.	The second sentence is contradictory with the first one and not consistent with SSR-3. The proposed modification uses the wording of SSR-3		X Text now reads, "All requirements are applicable to all types of research reactor and cannot be waived. Guidance is provided in this Safety Guide on whether and how the application of the requirements in SSR-3 [1] can use a graded approach."		Safety Guides cannot use "shall" unless it is quoted from a requirements document. The sentence is consistent with SSR-3 6.18 The expression "can be graded" has been removed throughout the document.
9	NUSSC	Germany	15	1	8			Para 6.18 of SSR-3 [1] states, "The use of a graded approach in the application of the safety requirements shall not be considered as a means of waiving safety requirements and shall not compromise safety". All requirements are applicable to all types of research reactor and cannot be waived. However, certain requirements may not be applicable to a given design of a research reactor. Guidance is provided in this Safety Guide on whether and how the implementation of the requirements in SSR-3 [1] can be applied using a graded approach.	The addition takes into account the case if a requirement is not applicable e.g to the design of a specific research reactor?			X	Where there are cases of a requirement not being applicable to specific designs of research reactor, it is preferred to address that in the detailed guidance. That allows the guidance in 1.8 to make a clear statement that requirements cannot be waived.

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10	NUSSC	Germany	16	2	1			The use of a graded approach in the application of the safety requirements for research reactors in SSR-3 ~~is~~ should be valid in all stages of the lifetime of a research reactor (see para. 1.5).	A common IAEA formulation should be used.			X	editorial: This statement is not a recommendation, it is a statememnt of the scope. "Should" is not appropriate.
11	NUSSC	USA	2	2	1			(see para. 1.57)	Paragraph 1.7 is a better reference for what is meant by "lifetime."	X			
12	NUSSC	Germany	17	2	2			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, since the use of experimental devices may affect the performance of reactors. In addition, the need for flexibility in their use requires a different approach to achieving and managing safety.	It is very essential information. However, it is not a recommendation. Please move this Para. to the Chapter BACKGROUND" (new 1.5)			X	Para 2.2 together with 2.3 provide the context for this section "GENERAL CONSIDERATIONS"
13	NUSSC	Germany	18	2	2			(…) Design and ~~operating~~ characteristics of research reactors may vary significantly, ~~since~~ in particular the use of experimental devices may affect ~~the~~ nuclear safety ~~performance of reactors~~. In addition, the need for flexibility in their use requires a different approach to achieving and managing safety.	Experimental devices will not affect the performance of the research reactors. The main objective of research reactors is to drive experimental devices/facilities. It is more important to emphasize here, that experimental facilities may have an impact on nuclear safety		X Text now reads, "Design and operating characteristics of research reactors may vary significantly, since in particular the use of experimental devices may affect the performance of reactorsintroduce specific potential hazards."		Experimental devices do not affect nuclear safety but they do introduce potential hazards which must be analyzed and addressed in design and operation.
14	NUSSC	Germany	19	2	3			Because of the wide range of designs, operating conditions, radioactive inventories and utilization activities, the safety requirements for research reactors are not applied to every research reactor in the same way. 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, the public and the environment. SSR-3 [1], which applies to a wide range of research reactors, includes information on the application of the safety requirements in accordance with a graded approach (see paras 2.15-2.17 of SSR-3 [1]).	It is very essential information. However, it is not a recommendation. Please move this Para. to the Chapter "BACKGROUND" (new 1.6)			X	Para 2.2 together with 2.3 provide the context for this section "GENERAL CONSIDERATIONS"
15	NUSSC	Germany	20	2	5			The use of a graded approach should be based on ~~safety~~ analyses of the hazard potential, ~~regulatory requirements~~ and in addition on expert judgement.	The sentence is misleading, by means of the graded approach the scope and effort of safety analysis, the stringency of regulatory requirements will be adapted to a certain research reactor facility. See also para. 2.6.			X	The text is consistent with the previous version of this Safety Guide. Regulatory requirements are an important constraint in the use of a graded approach, for example where a regulation includes an absolute requirement which cannot accommodate a graded approach.
16	NUSSC	Germany	21	2	5			~~Prescriptive regulatory approaches, resulting in very detailed regulatory requirements may restrict the use of a graded approach on some of the topics in this Safety Guide.~~	In case of a goal orient-ed regulatory frame-work, a certain flexibil-ity is given by nature and thus reducing the need for use of a graded approach. In particular in case of prescriptive regulatory frameworks application of a graded approach helps to mini-mize the risk of applying to strict and not neces-sary safety requirements for a specific research reactor facility.		X Text now reads, "Prescriptive regulatory approaches (see para 3.12 of GSG-13 [15]), 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."		This statement is not about the use of the graded approach internally by the regulatory body, but about how a prescriptive regulatory approach may constrain the use of a graded approach by the operating organization. The text has been modified to make that clear.

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17	NUSSC	Japan	2	2	5			The use of a graded approach should be based on safety analyses~~,~~ and regulatory requirements~~, and~~ with taking expert ~~judgement~~ advice and operational experiences of similar type installations into account. Expert ~~judgement~~ advice 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~~ advice is documented. Prescriptive regulatory approaches [nn1], resulting in very detailed regulatory requirements may restrict the use of a graded approach 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. (footnote nn1) A prescriptive regulatory approach places a great deal of importance on the adequacy of the regulations for safety and requires detailed development. The regulations could establish detailed technical requirements or identify specific issues that the operating organization and its suppliers should address and present for assessment by the regulatory body (para 2.80. of SSG-16Rev.1) [mm1]. *[addition to REFERENCES]* (mm1) 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).	i) Concerning expert judgement, this element in not 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 SSR-3 states, "… Grading of the application of requirements shall be justified and supported by safety analysis or engineering judgement." These description implies that an existence of expert is only a supporter in all means. It is the role of senior management to make a judge in every parts of activities performed in operating organization, using the effective support from experts. ii) Operational experiences is one of important element to be considered in the safety design. iii) Please add explanation of "prescriptive regulatory approach" for clarification and user-friendliness by citing from para 2.80 of SSG-16Rev.1.		X Footnote added, "Prescriptive and performance based regulatory approaches are described in para 2.80 of IAEA Safety Standards Series No. SSG-16 Rev. 1, Establishing the Safety Infrastructure for a Nuclear Power Programme [13]." New reference has been added		The phrase "expert judgement" has not been removed because it is widely used and consistent with the 2018 IAEA Safety Glossary. Para 6.18 states that engineering judgement can justify the use of a graded approach.
18	NUSSC	Germany	22	2	6			~~The use of a graded approach in the application of safety requirements should determine the appropriate effort to be expended and appropriate manner of complying with the safety requirement, in accordance with the characteristics and the potential hazard of the facility~~. The characteristics and potential haz-ard of the facility determine the ap-propriate application of safety re-quirements via a graded approach	The paragraph is mis-leading. The degree of grading should be determined by the hazard potential.		X Text now reads, "The result of the use of a graded approach in the application of safety requirements should be a decision on the appropriate effort to be expended and appropriate manner of complying with..."		Original text was unclear. It was intended to describe the results of the graded approach.
19	NUSSC / WASSC	Finland	1	2	7			It is recommended that the final decision is based on multidisciplinary expert group even when a quantitative method has been applied.	Original text is too general. Can the decision for example be made by one expert only or what is the objective of this sentence? Grading should be used also when considering the scope and depth of expertise needed.			X	This sentence has been deleted. See also comment #3
20	NUSSC	Germany	23	2	7			The method to determine the graded approach may be quantitative, qualitative or a combination of both. ~~It is recommended that t~~The final decision should be ~~is~~ based on expert judgement even when a quantitative method has been applied. The applicant, licensee or operator should propose and justify any grad-ing of safety requirements. The regu-latory body should decide whether to accept or to deny a proposed grading of safety requirements. The graded approach presented in this Safety Guide has two steps. First is the cate-gorization of the facility in accord-ance with its potential hazard. Second is consideration of a specific safety requirement from SSR-3 [1], and the analysis of any activities and/or SSCs important to safety associated with that requirement.	A common IAEA formulation should be used. An important element of applying the graded ap-proach is justification of a grading, because it formally results in a deviation from the es-tablished safety re-quirements. The appli-cant/licensee should justify any kind of grad-ing and the proposed grading need to be ac-cepted or denied by the regulatory body by regu-latory decision making.		X The sentence "It is recommended that the final decision is based on expert judgement even when a quantitative method has been applied." has been deleted. No other changes to the para		How a regulator oversees an operating organization implementing a graded approach will vary between member states. The use of a graded approach does not result in a deviation from a requirement.
21	NUSSC	Japan	3	2	7			The method to determine the graded approach may be quantitative, qualitative or a combination of both. It is recommended that the final decision is based on results of safety analysis with taking expert ~~judgement~~ advice into account ~~even when a quantitative method has been applied~~.	See comment No. 3. Also, It is not reasonable that expert judgement outweigh quantitative results.		X The sentence "It is recommended that the final decision is based on expert judgement even when a quantitative method has been applied." has been deleted. The use of a combination of safety analysis, regulatory requirements and expert judgement is stated in para 2.5		The use of the "results of safety analysis" as a basis for a graded approach is already stated in Para 2.5. Gudiance on the use of expert judjment is also mentioned in the same para Deleted from Para 2.7
22	NUSSC	USA	3	2	7			The overall method to determine… First is the qualitative categorization of the facility in accordance with its potential hazard (see para. 2.16 of SSR-3 [1]). …and the quantitative and/or qualitative analysis of any activities and/or SSCs ~~important to safety~~ subject to or associated with that requirement.	Clarity and consistency with SSR-3 and paragraph 2.8, and add reference to related requirement. "Important to safety" is redundant because any SSC associated with an SSR-3 requirement is important to safety.	X			

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23	NUSSC	Australia	1	2	8	first bullet		Facilities with significant potential for an off-site radiological hazard e.g. research reactors with high operating power, large radioactive inventory, presence of high-pressure experimental devices	Many facilities having on-site impact will also have a negligible off-site impact. If any off-site hazard makes a facility high hazard facility then this category will also include those facilities that should be categorized as medium potential hazards. Is there a chance to establish a threshold for the off-site impact?	X			
24	NUSSC	Germany	24	2	8			*It would be desired if more guidance could be provided on how to determine the potential radiological hazard of a certain research reactor facility.*	From our practical experience we know that determining the radiological hazard potential is the most demanding and crucial task in applying a graded approach. From our point of view, Member States would benefit from more guidance on this topic.		X Added a final sentence to para 2.8 "Section 3 of DS509F [7] provides further guidance on evaluating the radiological hazard of research reactors."		
25	NUSSC	Japan	4	2	8			Qualitative categorization of the facility should be performed on the basis of the potential radiological hazard, using a multi-category system: – Facilities with potential for an off-site radiological hazard e.g. research reactors with high operating power, large radioactive inventory, presence of high-pressure experimental devices. These facilities are categorized as a high potential hazard. This category of facility is require to fully meet any requirements established in SSR-3 without application of graded approach.	It is important to describe explicitly that facility with a high potential hazard must satisfy all of the requirements established in SSR-3 without any application of graded approach.			X	A blanket statement is not appropriate here as the basis for a graded approach is different for each of the 90 requirements, and is sometimes dependent on other factors than the potential hazard of the facility.
26	NUSSC	Japan	5	2	8			Facilities with potential for an off-site radiological hazard which may affect public health and the environment in areas beyond the site boundary; e.g. research reactors with high operating power, large radioactive inventory, presence of high-pressure experimental devices. - Facilities with potential for an on-site radiological hazard ~~only~~ which may not affect public health and the environment in areas beyond the site boundary, but may affect personnel in that site; e.g. research reactors with operating power up to a few MW, limited radioactive inventory, no high-pressure experimental devices. - Facilities with no potential radiological hazard beyond the research reactor hall and associated beam tubes or connected experimental facility areas e.g. facilities with low operating power, not requiring heat removal systems, a small radioactive inventory.	Definition or explanation should be added on these "radiological hazard". For instance, "potential radiological hazard" means that level of radiological release of the core inventory without the physical and engineered barriers which may affect public health and environment at the site boundary. Necessity of the emergency preparedness depends on the definition.			X	The terms "off-site" and "on-site" are defined in the IAEA Safety Glossary, and used throughout the series of safety guides.
27	NUSSC	USA	4	2	8			***Revise first bullet point as follows, and other two bullets similarly:*** Facilities with potential for an off-site radiological hazard ~~e.g.~~ Such facilities could include, but are not limited to, research reactors with high operating power, large radioactive inventory, and presence of high-pressure experimental devices. These facilities are categorized as a high potential hazard.	Correct typos, clarify, and emphasize that these are not exhaustive lists, and that high power/inventory does not necessarily indicate high hazard, and vise-versa.	X			
28	NUSSC	Germany	25	2	9	(a)		The reactor power (for pulsed reactors, energy deposition is typically used)	Former information on pulsed reactors is missing			X	The list in Para 2.9 is taken from para 2.17 in SSR-3. (The additional text was removed during the revision from NS-R-4)
29	NUSSC	Germany	26	2	9	(e)		The type of fuel elements and its chemical composition;	The chemical composi-tion is also relevant while evaluating the potential hazard.			X	The list in Para 2.9 is taken from para 2.17 in SSR-3
30	NUSSC	Japan	6	2	9			(k) The ease or difficulty in changing the overall configuration. ~~(~~Modifications and experiments are an important aspect of research reactor design and operation. See paras 6.154-6.157 and 7.70 for specific recommendations~~)~~.	Description breaks here and create new line to keep consistency with the description in SSR-3.		X The text in brackets has been removed and placed in a footnote.		Because the text in brackets was related to item (k) in the list, it was not appropriate to add it as a following sentence.
31	NUSSC	USA	5	2	9	k		~~(Modifications and experiments are an important part of research reactor design and operation. See paras 6.154-6.157 and 7.70 for specific recommendations).~~	Cross reference is not relevant to the point of this list. Also, not all the cited paragraphs actually discuss recommendations, and items (a) through (k) otherwise match SSR-3 except for the inclusion of this cross-reference.		X The text has been moved to a footnote to maintain (a) - (k) consistent with the list in SSR-3		

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32	NUSSC	Germany	27	2	10			On the basis of these characteristics, the application of expert judgement, and consideration of any other factors which affect the potential radiological hazard from the facility, a high, medium or low potential hazard should be identified and used in the analysis in step 2. This expert judgement should be documented in a traceable and comprehensible manner to justify the grading and to ensure transparency of decisions made.	In the past, grading has been performed but, today, the reasoning behind the decisions made are no longer comprehensible. Therefore, we propose to recommend a proper documentation and justification of any grading of safety requirements. This will also contribute to more transparency in regulating research reactors.		X The 2nd sentence in para 2.5 has been updated, "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 approval using a process in the management system."		The need for documenting expert judgement is addressed in 2.5 and has been further clarified.
33	NUSSC / WASSC	Finland	2	2	11			Graded approach should be based on the results and insights from a safety assessment, in which the safety significance of all relevant items and SSCs, as well as potential risks, are determined (see DS510A).	Safety assessment in accordance with DS510A provides more insights than just the safety significance of SSCs. Also, the basis for grading shall be clearly stated here.		X Text now reads, "The safety function, safety significance and potential risks of SSCs is determined by conducting a safety assessment."		Safety assessment is an important but not the only basis for the application of a graded approach. E.g. for a graded approach to elements of the management system.
34	NUSSC	Germany	28	2	11			Paras. 2.11 – 2.14 should be completely revised. From our point of view, paras. 2.8-2.13 of the current SSG-22 are much more appropriate.	We suggest to revise paras. 2.11 -2.14 to provide a better guidance to MS on how to perform Step 2.	X			Paras 2.11 - 2.14 have been extensively revised, following comments from several reviewers, to provide guidance on how to perform step 2.
35	NUSSC	Germany	29	2	11			Given the categorization of the facility from step 1, an analysis should be performed in order ~~is required~~ to determine the appropriate manner for meeting a specific safety requirement using a graded approach. A safety requirement may apply to an SSC, an element of the management system or an experiment, each of which can be analysed to determine its safety significance. ~~Requirement 16 in SSR-3 [1] states, "All items important to safety for a research reactor facility shall be identified and shall be classified on the basis of their safety function and their safety significance". The safety function and safety significance of SSCs is determined by conducting a safety assessment (see DS510A [10]). When considering a graded approach in the design of SSCs, para 6.32 of SSR-3 [1] states "The basis for the safety classification of the structures, systems and components shall be stated and the design requirements shall be applied in accordance with their safety classification." The application of design requirements commensurate with the safety classification of an SSC is the basis of a graded approach in the design process.~~	A common IAEA formulation should be used. Mentioning requirement 16 of SSR-3 is mislead-ing. Applying an appro-priate classification au-tomatically results in an adequate safety category (see IAEA SSG-20). Sufficient guidance is already available, thus this excerpt to safety classification can be deleted.		X "Given the categorization of the facility from step 1, an analysis should be performed to determine the appropriate manner for meeting a specific safety requirement using a graded approach. A safety requirement may apply to an SSC, or an element of the management system. The safety significance of each SSC or management system element (including SSCs and management system elements related to experiments) can be determined through the step 2 analysis. Requirement 16 in SSR-3 [1] states, "All items important to safety for a research reactor facility shall be identified and shall be classified on the basis of their safety function and their safety significance". The safety function and safety significance and potential risks of SSCs is determined by conducting a safety assessment (see DS510A [10] for guidance). When identifying SSCs that are important to safety, classifying them by their importance to safety, and then considering a graded approach in the design of SSCs, para 6.32 of SSR-3 [1] states "The basis for the safety classification of the structures, systems and components shall be stated and the design requirements shall be applied in accordance with their safety classification." The application of design requirements commensurate with the safety classification of an SSC is the basis of a graded approach in the design process."		Paragraph revised to meet the intent of this comment and to resolve comments from other member states.
36	NUSSC	USA	6	2	11			A safety requirement may apply to an SSC~~, or~~ an element of the management system ~~or an experiment, each of which can be analyzed to determine its safety significance.~~ The safety significance of each SSC or management system element (including SSCs and management systems related to experiments) can be determined through the step 2 analysis.	Improve clarity, and experiments are not used to meet safety requirements and do not have "safety significance". SSCs and management controls should cover the controls/design features used to ensure experiment safety.	X			

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37	NUSSC	USA	7	2	11			(see DS510A [10] for guidance)	Clarify why DS510 is referenced.	X			
38	NUSSC	USA	8	2	11			When identifying SSCs that are important to safety, classifying them by their importance to safety, and then ~~When~~ considering a graded approach in the design of SSCs…	Improve clarity and consistency with SSR-3 para. 6-32.	X			
39	NUSSC	Germany	30	2	12			Requirement 7 from IAEA Safety Standards Series No. GSR Part 2, Leadership and Management for Safety [13] states, "The criteria used to grade the development and application of the management system shall be documented in the management system. The following shall be taken into account: (a) The safety significance and com-plexity of the organization, operation of the facility or conduct of the activ-ity; (b) The hazards and the magnitude of the potential impacts (risks) associat-ed with the safety, health, environ-mental, security, quality and econom-ic elements of each facility or activi-ty; (c) The possible consequences for safety if a failure or an unanticipated event occurs or if an activity is inad-equately planned or improperly car-ried out."	Please reformulate, his Para. contains only a citation of the Requirement, it is not a recommendation. Compare also with 3.16., this could be a good example. Combination with 2.13. could be a practicable solution.			X	Para 2.11 introduces the idea of applying a graded approach to an element of the management system. This para provides a helpful reference to the related requirements.
40	NUSSC	USA	9	2	12			With regard to analyzing the safety significance of elements of the management system, and then applying grading in meeting management system requirements, r~~R~~equirment 7 from…	Clearer transition from paragraph 2.11, which mentions management systems but mostly discusses SSCs.	X			
41	NUSSC	USA	10	2	12			***Add to end of paragraph:*** The safety significance of elements of the management system is also determined by conducting a safety assessment (see DS510A [10] for guidance).	Consistency with paragraph 2.11, this is stated for SSCs so it is also helpful to reference with respect to management systems- safety assessment/SAR should cover both.		X Sentence added at the end of the para, "Paras 2.37 - 2.40 in GS-G-3.1 [18] provide recommendations on how elements of the management system can be assessed, to support a graded approach in the application of management system requirements."		DS510A does not provide many recommendations on the safety assessment of the management system.
42		Belgium	1	2	13			… the specific characteristics ~~of the~~ of the facility such as …	Typographical correction	X			
43	NUSSC / WASSC	Finland	3	2	13			…Expert judgment should be used in the analysis.			X Text now reads, "...the appropriate level of effort needed, and the manner in which the requirement will be met. Expert judgement, from a single expert or a multidisciplinary group as appropriate, should be included in the analysis."		Text revised in response to comment #1 and #3 "expert judgement" is terminology consistent weith the IAEA safety glossary and does not need further specification. It may come from one or more experts.
44	RASSC	Germany	121	2	13			The analysis should consider the magnitude of the potential hazard that can result from the research reactor, the specific characteristics of the ~~of the~~ facility such as those listed in para 2.9,	duplication	X			

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45	WASSC	Germany	130	2	13			The analysis should consider the magnitude of the potential hazard that can result from the research reactor, the specific characteristics of the ~~of the~~facility such as those listed in para 2.9, the safety significance of the SSC affected, and therefore the appropriate level of effort needed, and the manner in which the requirement will be met.	Surplus words.	X			
46	NUSSC	Japan	7	2	13			The analysis should consider the magnitude of the potential hazard that can result from the research reactor, the specific characteristics of the ~~of the~~ facility such as those listed in para 2.9, the safety significance of the SSC affected, and therefore the appropriate level of effort needed, and the manner in which the requirement will be met. The analysis ~~should~~ may include an amount of expert ~~judgement~~ advice.	Expert judgement should be one of the information for decision making, (See comment No. 3.)		X "of the" has been deleted Last sentence now reads, "Expert judgement, from a single expert or a multidisciplinary group as appropriate, may be included in the analysis."		"expert judgement" is terminology consistent with the IAEA safety glossary
47	NUSSC	USA	11	2	13			The step 2 analysis to determine how requirements related to SSCs and/or management systems are met should consider the overall categorization of the facility from step 1 ~~magnitude of the potential hazard that can result from the research reactor, the specific characteristics of the facility such as those listed in para 2.9~~, the safety significance of the SSC and/or management system element affected, and therefore the appropriate level of effort needed in meeting a requirement, and the manner in which the requirement will be met.	Overall clarity, and also clarify that this process is not limited to SSCs, but covers management systems as well. Replace wording "magnitude of the potential…para 2.9" with reference to step 1, because this was already part of step 1 (it is recognized that these specific details may need further consideration in step 2 analysis, but this is covered by considering "the safety significance of the SSC and/or management system element affected").		X Text now reads, "The analysis in step 2, to determine how requirements related to 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. Expert judgement may be included in the analysis."		
48	NUSSC	Germany	31	2	14			Specific guidance on the use of a graded approach in the application of each safety requirement is provided in the following sections, including both, aspects that should be graded and those that ~~where a requirement~~ cannot be applied using a graded approach. Examples are given for the application of requirements for research reactors with a high, medium, or low potential hazard.	This Para. should be more precise. In general, the requirements are not allowed to be graded, but the way how to fulfil the requirements may varies strongly. Additionally, it is very essential information, however it is not a rec-ommendation. Please move this para. To the Chapter "Structure" (new 1.10)		X Text now reads, "Specific guidance on the use of a graded approach in the application of each safety requirement is provided in the following sections, including guidance on requirements that cannot be applied using a graded approach."		This para is introducing Sections 3 to 9 which immediately follow. It cannot be moved to section 1.
49	NUSSC	Germany	32	3	1				This paragraph creates confusion. Paragraph 1.9 states "The remaining sections provide recommendations on the application of a graded approach to requirements for regulatory supervision (Section 3); ... Sections 3– 9 have an identical structure to the corresponding sections of SSR-3 [1]. " While this is true for the topic of 3.1, the content deals solely with GSR Part 1 (rev. 1) and GSG-13.		X Para 1.9 reworded to state, "Sections 3 - 9 have a similar structure..."		Paragraph 3.1 references only GSR Part 1 and GSG-13 as SSR-3 does not have additional requirements on the legal and regulatory framework. SSR-3 has only 1 additional requirement (Requirement 1 on the safety analysis report) for which guidance on a graded approach is provided in para 3.12-3.14
50	NUSSC	USA	12	3	1			Owing to the broad applicability of the requirements ~~and recommendations~~ in this ~~these~~ publications…	Correct grammar, and GSR-1 provides only requirements, not recommendations.	X			

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51	NUSSC	USA	13	3	2	line 2		…possible radiation risks [2]……. Add footnote below: [2] The term 'possible radiation risks' relates to the maximum possible radiological consequences that could occur when radioactive material is released from the facility or the activity, with no credit being taken for the safety systems or protective measures in place to prevent this.	Add footnote (6) in GSG-13 that clarifies the term 'possible radiation risks'. Important to understand the meaning of 'possible radiation risks' to consider the use of graded approach.	X			
52	NUSSC	Germany	33	3	3			When planning or performing any of the regulatory activities listed in 3.1, one consideration for the regulatory body is how the operating organization has used a graded approach when applying the safety requirements from SSR-3 [1], including those for design and operation, using the recommendations from this Safety Guide.	Applying the graded approach to regulatory functions should be based on the magnitude of the possible radiation risks arising from the facility as well as the maturity or complexity of the facility. Grading of regulatory functions should be fully independent from any decisions made by the operating organization. Para. 3.6 provides sufficient guidance on these topics.	X			
53	NUSSC	Japan	8	3	4			*Move para 3.4 to footnote.* 3.4. (footnote) Regarding the application of a graded approach in the regulatory oversight of nuclear facilities, Ref. [16] TECDOC-XXXX, "Application of graded approach in regulating nuclear power plants, research reactors and fuel cycle facilities" describes the approaches currently implemented by several regulatory bodies around the world and, based on these examples, proposes a path to developing such an approach, including practical guidance on developing and implementing strategies and processes for regulators in applying graded approach in all regulatory functions. [16] INTERNATIONAL ATOMIC ENERGY AGENCY, Application of graded approach in regulating nuclear power plants, research reactors and fuel cycle facilities, IAEA-TECDOC-XXXX, IAEA, Vienna (in preparation)	Those description described in TECDOC are not consensus contents, and then move to footnote. Also. Delete Ref [16] from the list of REFERENCES.		X		All reference to the TECDOC (in preparation) has been removed
54	NUSSC	Germany	34	3	5	and 3.6			3.5 and 3.6 give guidance for the application of a graded approach to GSR Part 1 (Rev. 1) and not SSR-3. Why can the require-ments mentioned in 3.2 (old) SSG-22) now be graded? This implies that the independence of the regulatory body is grad-able.				The text in 3.5 and 3.6 is consistent with GSR Part 1 Rev. 1 para 2.3 which requires the implementation of national nuclear policy using a graded approach
55	NUSSC	Japan	9	3	5			Regarding the application of these general safety requirements, para 3.2. of SSR-3 [1] states, "The application of a graded approach that is commensurate with the potential hazards of the facility is essential and shall be used in the determination and application of adequate safety requirements	Clarification of origin.	X			
56	NUSSC	Germany	35	3	6			A graded approach to applying the requirements for a State's legal and regulatory infrastructure should includes analysis of: …	A common IAEA formulation should be used.	X			

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57	NUSSC	Japan	10	3	6			Even in ~~In~~ a State where the most hazardous nuclear facility is a single operating research reactor with a low potential hazard (see para 2.10), the national policy and strategy for safety ~~can~~ must meet the fundamental safety objective, however implementation of the national policy and strategy for safety may be graded through a less comprehensive set of policy mechanisms and internal resources than in a State with a large and diverse nuclear infrastructure. A graded approach to applying the requirements for a State's legal and regulatory infrastructure includes analysis of: – the radiation risks associated with facilities and activities; – the human and financial resources; – the type of authorization process; – the provision for regulatory review; – the appropriate inspection and enforcement regulations; – the communication and consultation with interested parties, necessary for the government to meet the fundamental safety objective. Further detail is provided in Requirement 1 and 2 of GSR Part 1 (Rev. 1) [14] ~~and in Ref. [16].~~ *N footnote (*N) Some examples are shown in TECDOC-XXXX, "Application of graded approach in regulating nuclear power plants, research reactors and fuel cycle facilities"	This message is against Requirement 1 of GSR Part 1(Rev.1) and also para 4.5, of this draft guide saying "The requirement to establish and implement a safety policy cannot be applied using a graded approach. The safety policy is a central component of an integrated management system, to ensure that any activities across the operating organization place safety as the highest priority." Where, Requirement 1 of GSR Part 1 (Rev. 1) states "**The government shall establish a national policy and strategy for safety, the implementation of which shall be subject to a graded approach in accordance with national circumstances and with the radiation risks associated with facilities and activities, to achieve ….**". This implies that it is implementation of national policy and strategy for safety that may be graded. ii) Those descriptions described in TECDOC are not consensus ones, and then move to footnote. Also. Delete Ref [16] from the list of REFERENCES.		X In a State where the most hazardous nuclear facility is a single operating research reactor with a low potential hazard (see para 2.10), the national policy and strategy for safety ~~can~~ is required to meet the fundamental safety objective, however the implementation of the national policy and strategy for safety may use a graded approach ~~through~~ with a less comprehensive set of policy mechanisms and internal resources than in a State with a large and diverse nuclear infrastructure. A graded approach to applying the requirements for a State's legal and regulatory infrastructure includes analysis of: – the radiation risks associated with facilities and activities; – the human and financial resources; – the type of authorization process; – the provision for regulatory review; – the appropriate inspection and enforcement regulations; – the communication and consultation with interested parties, necessary for the government to meet the fundamental safety objective. Further detail is provided in Requirement 1 and 2 of GSR Part 1 (Rev. 1) [14] and in Ref. [16]. *N		Minor editorial changes. The reference has been removed and the footnote added
58	NUSSC	USA	14	3	6			*Move first bullet "the radiation risks associated with facilities and activities" into the sentence above the bullets:* A graded approach to applying the requirements for a State's legal and regulatory infrastructure includes analysis of the radiation risks associated with facilities and activities, and:	"The radiation risks associated with facilities and activities" does not belong in the bulleted list because it is not "necessary for the government to meet the fundamental safety objective."	X			
59	NUSSC	Germany	36	3	8	3-6		The responsibilities of the regulatory body should include establishing regulations, review and assessment of safety related information (e.g. from the safety analysis report), issuing authorizations, performing compliance inspections, taking enforcement actions and providing information to other competent authorities and the public.	A common IAEA formulation should be used.	X			
60	NUSSC	Germany	37	3	10			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 reac-tor, these stages should include are: (a) Site evaluation; (b) Design; (c) Construction; (d) Commissioning; (e) Operation, including utilization and modification; (f) Decommissioning;	A common IAEA formulation should be used.	X			
61	NUSSC	Germany	38	3	12	Item 5		Reviewing, ~~and~~ assessing and approval operational limits and conditions	Operating limits and conditions are significant for safety and should additionally be approved. (Compare with SSG-22, 3.8.)		X Text now reads, "Reviewing, assessing, and approving operational limits and conditions;"		

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62	NUSSC	USA	15	3	12			*Add "Authorizing construction" to list.* – Reviewing and assessing operational limits and conditions; – Authorizing construction; – Authorizing commissioning;	The regulatory body exercises control during the construction stage to ensure the safe design and operation of the facility.	X			
63	NUSSC	Germany	39	3	13			The steps in the authorization process apply to all research reactors, ~~including all proposed experiments and modifications, at all stages of the reactor lifetime~~.	SSG-24 lists experiments and modification with minor or no safety significance where no approval by the regulatory body is necessary.		X Text now reads, "The steps in the authorization process apply to all research reactors, including all proposed experiments and modifications (see SSG-24 [11]),..."		
64	NUSSC	Japan	11	3	13			The steps in the authorization process apply to all research reactors, including all proposed experiments and modifications, at all stages of the reactor lifetime. However, at each step in the authorization process, a graded approach ~~should~~ may be used in the application of the safety requirements by the regulatory body, depending on the potential hazard of the facility.	This message is not a positive recommendation, but is acceptable level.	X			
65	NUSSC	Japan	12	3	14			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]. The responsibilities of the regulatory body include the review and assessment of safety related information from the safety analysis report. A graded approach ~~should~~ may be used in the application of these requirements. The level of detail ~~requested from the operating organization~~ 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.	Ditto A decision of the level of details in safety-related documentation should not be based on request from operating organization, rather on safety significance of facilities.	X			
66	NUSSC	Germany	40	3	15	last sentence		~~Annex I~~ Appendix in DS510A	Wrong citation	X			
67	NUSSC	Japan	13	3	15			A graded approach should be used in applying the requirement to prepare a safety analysis report, for example, the level of detail necessary to demonstrate that acceptance criteria are met should be commensurate with the potential hazard of the research reactor. For research reactors with a higher potential hazard, typically more detailed analysis is required to demonstrate safety in all operating and accident conditions, with less use of large bounding analyses. For a facility with a low potential hazard, the safety analysis report may include ~~large safety margins and~~ bounding analyses owing to its considerable margin to demonstrate that the research reactor can be operated safely. ~~For research reactors with a higher potential hazard, typically more detailed analysis is required to demonstrate safety in all operating and accident conditions, with less use of large bounding analyses.~~ (3.15a) The use of probabilistic safety assessment to supplement deterministic safety analysis as appropriate, is another element of the safety analysis report that could vary in scope based on the potential hazard of the facility (see Requirement 41 in SSR-3 [1]). Annex I in DS510A [10] provides guidance on applying the requirement for safety assessment and a safety analysis report suggesting a graded approach commensurate with the magnitude of the potential hazards.	i) The case of installations with a higher potential hazard should come first, and then followed by the case of installations with a low potential hazard. ii) Large safety margin is not always need for an installation with a low potential hazard and small margin may be acceptable to an installation with a low potential hazard. iii) A use of probabilistic safety assessment is other aspect of degree of details of safety analysis, as stated in following text, and then suggested to create new paragraph.		X Text now reads, "For research reactors with a higher potential hazard, typically more detailed analysis is required to demonstrate safety in all operating and accident conditions, with less use of large bounding analyses. For a facility with a low potential hazard, the safety analysis report may include ~~large safety margins and~~ 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 required to demonstrate safety in all operating and accident conditions, with less use of large bounding analyses.~~		Minor editorial changes. The remainder of the para has been moved to a new para, as proposed

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68		Republic of Korea	2	3	15	Lines 3-7		… For a facility with a low potential hazard, ~~the safety analysis report may include large safety margins and bounding analyses~~ sufficient safety margin may accommodate many bounding analyses to demonstrate that the research reactor can be operated safely. For research reactors with a higher potential hazard, typically more detailed analysis is required to demonstrate safety in all operating and accident conditions, ~~with less use of large bounding analyses~~ leading to less use of bounding analyses. …	Existing sentences are not easily understood. The term 'Safety analysis report' can be removed because the title is 'safety analysis report.'		X Text now reads, " For research reactors with a higher potential hazard, typically more detailed analysis is required to demonstrate safety in all operating and accident conditions, with less use of large bounding analyses. For a facility with a low potential hazard, the safety analysis ~~report~~ may include ~~large safety margins and~~ bounding analyses, due to large safety margins in the design, to demonstrate that the research reactor can be operated safely."		More than one comment was received on this para
69	NUSSC	Germany	41	3	16	last sentence		(…) A graded approach should be applied with respect to the corrective action process for non-conformances, to ensure that problems of the highest significance are afforded the most critical evaluation ~~(see para. 6.68 of GS-G-3.1 [18])~~.	The reference to GS-G3.1 is misleading and used in the wrong context. GS-G-3.1 deals with non-conformances of the management system of the operating organization whereas para. 3.16 deals with enforcement due to non-conformances of the facility with applicable safety requirements as a regulatory function.		X The sentence has been deleted including the reference as it is not about enforcement		
70	NUSSC	Germany	42	3	18			Some of the factors that should be ~~to~~ considered in determining the appropriate level of enforcement actions are:	A common IAEA formulation should be used.	X			
71	NUSSC	USA	16	3	18			Whether the authorized party identified and implemented corrective actions sufficient to correct the violation and prevent recurrence ~~The complexity of the corrective action necessary~~;	Suggested change enhances application of a graded approach by crediting prompt identification and correction towards determining the appropriate level of enforcement. Unclear how complexity of corrective actions needed would be applied to graded approach of enforcement.	X			
72	NUSSC	Japan	14	3	19			Enforcement actions in response to an intentional violation of a regulatory requirement should be ~~appropriately~~ considerably serious. This is necessary to hold regulatory compliance in the highest regard.	Better wording.			X	"considerably" cannot be used in this context.
73	NUSSC	Germany	43	4	3	first sentence		There are elements of this requirement which cannot be graded ~~applied using a graded approach~~, for example, for the operating organization to have prime responsibility for the safety of the research reactor, and the requirement to develop and sustain a strong culture for safety.	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
74	NUSSC	Japan	15	4	3			The organization structure for the operating organization, and the definition of minimum staff required in the facility during operation, should account for the emergency preparedness and response required to ~~all anticipated operational occurrences and~~ accident conditions.	Anticipated operational occurrences do not require emergency preparedness and response.		X Text now reads, "...should account for the operational response to anticipated operational occurrences and the emergency preparedness and response required ~~to~~ for all ~~anticipated operational occurrences and~~ accident conditions"		
75	NUSSC	USA	17	4	3			Suggest splitting the paragraph into 2 paragraphs, one covering aspects that can't be graded and one covering aspects that can be graded. Suggest splitting the paragraph after the first sentence and adding an additional sentence to elaborate on elements that can't be graded. Also suggest that the paragraph covering elements that can be graded comes before the paragraph discussing elements that can't be graded.	As written, the paragraph begins, "There are elements of this requirement which cannot be applied using a graded approach…" However, except for the first sentence, the paragraph discusses only elements of the requirement that can, and should, be graded, which could confuse the reader.		X Para split in two as suggested The order of the sentences remains the same		The format of stating a requirement, identifying aspects that cannot be graded, then a discussion on the graded approach for the requirement is used consistently throughout the document.

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76	NUSSC	Germany	44	4	4			The requirement to establish and implement a safety policy cannot be graded ~~applied using a graded approach~~. The safety policy is a central component of an integrated management system, to ensure that any activities across the operating organization place safety as the highest priority.	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
77	EPReSC	Germany	119	4	7			The following are examples of elements of the management system where this requirement can be applied using a graded approach: - ~~Testing, surveillance, m~~Maintenance, periodic testing and inspection ~~activities~~;	To be commensurate with the order of measures used in paragraph 7.2 of SSR-3.	X			
78	NUSSC	USA	18	4	7			Combine the 2nd and 7th bullets regarding operating procedures to read: Level, amount of detail and degree of review and approval of operating procedures;	Both bullets deal with application of a graded approach to operating procedures.		X Bullet now reads, "Level of detail and degree of review and approval of operating procedures"		The level of an operating procedure is not a target for a graded approach
79	NUSSC	USA	19	4	7			Modify the 4th bullet to read: Scope, depth and frequency of operational safety reviews and controls, including internal and independent audits;	Clarify that internal and independent audits discussed para. 4.1(e) of SSR-3 can be implemented using a graded approach. It did not appear that this was covered elsewhere in Section 4.	X			
80	NUSSC	Japan	16	4	8			Procedures for a research reactor with a high potential hazard should be subject to a level of review and approval commensurate with their safety significance. ~~A procedure for a simple maintenance task on a component in a non-active system with low safety significance could be written by an experienced member of the engineering personnel and reviewed by a maintenance supervisor.~~ A procedure for use in the control room to start up the reactor should be subject to more rigour in the level of detail and extent of review. For a research reactor with a low potential hazard, the expertise necessary to write and review new procedures may not always exist within the operating organization and could involve experts from the reactor designer or another external organization with appropriate knowledge. The level of review for procedures should also be commensurate with their safety significance. 4.8A. A procedure for a simple maintenance task on a component in a non-active system with low safety significance could be written by an experienced member of the engineering personnel and reviewed by a maintenance supervisor.	The second sentence is focused on maintenance procedure, differing from other part of this paragraph. It is suggested this para to be separated from this para, creating new para.			X	The first sentence introduces the idea that the level of review can vary for different procedures. The next two sentences give two examples of a low risk activity and a high risk activity where the procedures require different levels of review.
81	NUSSC	Germany	45	4	14			Requirements for the safety committee are established in requirement 6 of SSR-3 [1]. One element of this requirement that cannot be graded ~~applied using a graded approach~~, is the establishment of a safety committee. (…)	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, the technically precise language is "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
82	NUSSC	Germany	46	5	2			~~Section 4~~ Requirement 3 of SSR-1 [19] discusses a graded approach	only the "Requirement 3: Scope of the site evaluation for nuclear installations" deals with a grading (Scope and level of detail)	X			

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83	NUSSC	Japan	17	5	2			…For a graded approach to the application of site evaluation requirements, the scope and depth of site evaluation studies and evaluations should be commensurate with the potential radiation risk associated with the facility. ~~The scope and detail of the site investigation may also be reduced if the operating organization proposes to adopt conservative parameters for design purposes, which may be a preferred approach for research reactors. For example, a conservative assumption for the design of a particular SSC that is readily accommodated in the overall design may permit simplification of the site evaluation.~~	It is not reasonable that the scope and detail of the site investigation may also be reduced. At the stage of site selection and site evaluation, the design itself of installation is unknown and conservatism is also unknown. The details of design and its conservatism will be made clear only after determination of site characteristics. Also, para 4.5 of SSR-1 states as follows; "For site evaluation for nuclear installations other than nuclear power plants, the following shall be taken into consideration in the application of a graded approach: (a)The amount, type and status of the radioactive inventory at the site (c)For research reactors, the thermal power;" SSR-3 does not mention conservatism of design for graded approach.		X Text now reads, "The scope and detail of the site evaluation may also be reduced if the operating organization proposes to adopt conservative parameters for design purposes that reduce the potential for on-site and off-site consequences in the event of an accident, which may be..."		The text is consistent with para 6.4 from SSG-35 and SSR-1 4.5 which include design features in the consideration for a graded approach
84	NUSSC	Germany	47	5	3	till 5.7		Hazards are incompletely addressed in section on "THE USE OF A GRADED APPROACH IN SITE EVALUATION". This section should be either completed to be comprehensive or describe a general approach common to all hazards.	Missing aspect are, e.g. •all site specific human induced hazards •biological hazards •clearer description of environmental impact (radiological) •population density •etc		X A paragraph has been added at the end of Section 5. "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 (para 1.6 IAEA Safety Standards Series No. NS-G-3.1, External Human Induced Events in Site Evaluation for Nuclear Power Plants [24]). 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])."		
85	NUSSC	Japan	18	5	4			~~5.4. Applying the requirements for site evaluation should use a graded 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.~~	Ditto. Whole sentence suggested to be deleted.			X	The text is consistent with IAEA siting guidance. See para 6.4 from SSG-35 and SSR-1 4.5 which include design features in the consideration for a graded approach
86	NUSSC	USA	20	5	4			~~Applying the~~The requirements for site evaluation should be applied useing a graded 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.	Clarity and grammar. Meaning of sentence is confusing when the second comma is included.		X The para has been deleted		
87		Republic of Korea	3	5	7	lines 4-6		… 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 present.	Typo error		X Text now reads, "...the potential radiological hazards, and hazards due to other materials present"		A comma was missing from this sentence.

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88	NUSSC	Germany	48	5	8	new		Paragraphs 5.33. – 5.37. of SSR-1 [19] provide criteria for use in applying a graded approach in the assessment of hazards associated with human induced events; similarly, paras 6.8. - 6.10. of SSR-1 [19] provide criteria with regard to population density and population distribution factors; and paras 5.32. of SSR-1 [19] establish important requirements with regard to other external events.	Please introduce a new Para. The consideration of of hazards associated with human induced events is significant for safety and should also be considered here. (Compare with SSG-22, 5.7.)		X New para added, "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 (para 1.6 IAEA Safety Standards Series No. NS-G-3.1, External Human Induced Events in Site Evaluation for Nuclear Power Plants [24]). 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])."		Reference has been added to the relevant safety guide which provides recommendations for meeting the requirements in SSR-1 More than one reviewer provided comments on this para
89		Belgium	2	5				We propose to add a paragraph on the use of a graded approach for protection against aircraft crash	In paragraphs 5.5 and 5.6, guidance is given for using a graded approach for seismic hazards and for volcanic hazards. It seems to us not logic to give guidance for volcanic hazards (applicable to very few countries), while for aircraft crash protection (applicable for all or almost all countries) no guidance is given. Therefore, we think that guidance on the graded approach for aircraft crash protection should be added. For a Belgian example, see reference in footnote1 https://afcn.fgov.be/fr/dossiers-dinformation/autres-etablissements-nucleaires/directives-pour-une-nouvelle-installation, Guidance on « Démonstration de la sûreté » and « Chute d’avion »		X New para added, "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 (para 1.6 IAEA Safety Standards Series No. NS-G-3.1, External Human Induced Events in Site Evaluation for Nuclear Power Plants [24]). 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])."		The new paragraph addresses all human induced events that are considered in site evaluation, including aircraft crash

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90	RASSC	Germany	122	5					Is there a reason, why hazards associated with human induced events like in the former SSG-22 para 5.7 is missing?		X New para added, "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 (para 1.6 IAEA Safety Standards Series No. NS-G-3.1, External Human Induced Events in Site Evaluation for Nuclear Power Plants [24]). 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])."		The criteria referenced in the previous SSG-22 para 5.7 were removed in the revision of NS-R-3 to SSR-1. Instead a reference to SSG-35 has been added.
91	WASSC	Germany	131	5				Also consider mentioning of human induced hazards and reference to NS-G-3.1 (DS520).	For completeness.		X New para added, "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 (para 1.6 IAEA Safety Standards Series No. NS-G-3.1, External Human Induced Events in Site Evaluation for Nuclear Power Plants [24]). 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])."		The criteria referred to in the previous version of SSG-22 were removed in the update from NS-R-3 to SSR-1. However SSG-35 contains criteria related to human induced events.

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92	NUSSC	Germany	49	6	1	second bullet			6.1 of SSR-3 states that "The general design re-quirements in this sec-tion shall be applied in the design of all types of research reactors." This statement is in con-tradiction with the sec-ond bullet of 6.1.			X	When implementing a graded approach, it is clear that all the requirements shall be applied. The issue is clarified in para 1.9, "Para 6.18 of SSR-3 [1] states, "The use of a graded approach in the application of the safety requirements shall not be considered as a means of waiving safety requirements and shall not compromise safety". All requirements are applicable to all types of research reactor and cannot be waived. Guidance is provided in this Safety Guide on whether and how the implementation of the requirements in SSR-3 [1] can be applied using a graded approach."
93	NUSSC	Germany	50	6	3			The control of planned radioactive releases is an element of this requirement that cannot ~~be applied using a~~ graded ~~approach~~. The control of releases is necessary to protect the public and the environment and ensure that facility operation meets applicable national environmental regulations.	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
94	NUSSC	Japan	19	6	3			The control of planned radioactive ~~releases~~ discharge during normal operation is an element of this requirement that cannot be applied using a graded approach. The control of ~~releases~~ radiological discharge is necessary to protect the public and the environment and ensure that facility operation meets applicable national environmental regulations.	Clarification with using IAEA terminology.		X The control of planned radioactive ~~releases~~ discharges during normal operation is an element of this requirement that cannot be applied using a graded approach. The control of ~~releases~~ radioactive discharges is necessary to protect the public and the environment and ensure that facility operation meets applicable national environmental regulations.		
95	NUSSC	Germany	51	6	4			The application of the main safety functions cannot be graded. A graded approach can be used in the application of some elements of the requirement for the main safety functions:	In general, the fundamental safety functions cannot be graded, only on certain elements a graded approach can be applied.		X A new sentence has been added to the beginning of para 6.3, "The design is required to ensure the fulfilment of the main safety functions. The use of a graded approach should result in design features which fully meet this requirement and are appropriate for the potential hazard from the research reactor."		The new text avoids the problem of stating that the requirement to have the main safety functions cannot be graded but how the main safety functions are implemented can be graded.
96	NUSSC	Germany	52	6	4	(a) (i)		The capability to shut down the reactor when necessary is required and cannot be graded~~, although the size of the subcriticality margin available and the speed of response required of the shutdown system may vary according to the reactor design~~.	Reaching subcriticality and maintaining subcriticality in the long term has to be always ensured. It should be emphasized, that this requirement cannot be graded.		X Text modified to read, "The capability to shut down the reactor when necessary is a requirement."		Using the phrase "is a requirement" makes clear that the shutdown capability must be in the design. The expressions "can be graded" and "cannot be graded" have been removed from the whole safety guide. Features such as speed of response can be different for different research reactor designs. This text was included in the existing SSG-22. See also response to comment 51

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97	NUSSC	Germany	53	6	4	(a) (ii)		Some research reactors may have inherent self-limiting power levels and/or systems that physically limit the amount of positive reactivity that can be inserted into the core. ~~These characteristics can be used for applying a graded approach to the design of the shutdown system.~~	This text may be misleading and could be misunderstood. Inherent self-limiting power levels prevents or even avoids power excursion like reactivity induced accidents (RIA) or accidents with anticipated transients without scram (ATWS). Irrespectively, the shutdown systems need to be designed to provide a sufficient shutdown margin irrespectively from the hazard potential.		X bullet (ii) deleted		
98	NUSSC	Germany	54	6	4	(b) (i)		For a research reactor requiring ~~facility with a high potential hazard~~ a forced convection cooling system to remove fission heat, including sufficient redundancy and separation for reliability, could be necessary to meet the acceptance criteria for the design in all operating conditions and accident conditions, whereas for research reactors with less demanding cooling needs ~~low potential hazard~~, such as some critical and subcritical assemblies, design requirements for removal of fission heat can be graded ~~could be generated at sufficiently low levels that it could be adequately removed without the need for an engineered system~~.	A “high potential hazard” is not an adequate criterion for requiring redundancy, separation, etc. This depends strongly on the design, the heat transfer from the fuel to the reactor pool and the heat capacity of the reactor pool.		X Text now reads, "For a some research reactors ~~with a high potential hazard~~ (typically with a medium or high potential hazard and higher power) a forced convection cooling system to remove fission heat~~, including sufficient redundancy and separation for reliability,~~ could be necessary to meet the acceptance criteria for the design, in all operating conditions and accident conditions, whereas research reactors with less demanding cooling needs~~low potential hazard,~~ such as some critical and subcritical assemblies, fission heat could be generated at sufficiently low levels that it could be adequately removed without the need for an engineered system."		Text has been revised to emphasise that a graded approach is based on the physical cooling needs of the reactor
99	NUSSC	Germany	55	6	4	(b) (ii)		Similarly, for the removal of decay heat following shutdown, the design of the cooling system can use a graded approach based on the cooling needs ~~potential hazard~~ of the facility, the power of the reactor, the design maximum level of fission products and the characteristics of the fuel. For a research reactor with a less demanding cooling needs, design requirements for ~~low potential hazard, where no heat removal system is required during operation, no dedicated equipment is necessary for~~ decay heat removal can be graded.	A “high potential hazard” is not an adequate criterion for requiring redundancy, separation, etc. This depends strongly on the design, the heat transfer from the fuel to the reactor pool and the heat capacity of the reactor pool.		X Text now reads, "Similarly, for the removal of decay heat following shutdown, the design of the cooling system can use a graded approach based on ~~the potential hazard of the facility~~factors such as, the power of the reactor, the design maximum level of fission products and the heat transfer characteristics of the fuel. For a research reactor with less demanding cooling needs~~a low potential hazard~~, where no heat removal system is required during operation, no dedicated equipment is necessary for decay heat removal."		
100	NUSSC	Germany	56	6	4	(c)		Confinement of radioactive material~~, shielding against radiation~~ and control of planned radioactive releases:	Design of shielding cannot be graded. Always, the shielding needs to be designed in such a way the radiological dose limits or derived dose rates will not be exceeded.			X	Shielding design is typically graded on the basis of the size of the radiological hazard
101	NUSSC	Germany	57	6	4	(c)(i)		The design of barriers and retention functions ~~SSCs~~ to confine radioactive material in operational states and accident conditions can use a graded approach, based on the potential hazard of the facility, the inventory of fission products, the characteristics of the fuel, and the results of safety analysis. (See also the description of the fourth level of defence in depth in para. 6.8).	To be more specific. Confinement of radioactive material is ensured by barriers and retention functions.		X Text now reads, "The design of SSCs to perform barrier or retention functions to confine radioactive material ..."		
102	NUSSC	Germany	58	6	4	(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 facility in operational states and in accident conditions where an operator action is required. The appropriate material and thickness of shielding can then be included in the design commensurate with the hazard.~~	Design of shielding cannot be graded. Always, the shielding needs to be designed in such a way the radiological dose limits or derived dose rates will not be exceeded.			X	Shielding design is typically graded on the basis of the size of the radiological hazard

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103	NUSSC	Germany	59	6	4	(c)(iii)		The requirement for the control of planned radioactive releases cannot be graded ~~applied using a graded approach~~.	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
104	NUSSC	Japan	20	6	4	(c) (iii)		The requirement for the control of planned radioactive ~~releases~~ discharge cannot be applied using a graded approach.	Ditto		X The requirement for the control of planned radioactive ~~releases~~ discharges cannot be applied using a graded approach.		
105	NUSSC / WASSC	Finland	4	6	5			…The requirement for the design to ensure that doses to reactor personnel and the public are kept as low as reasonably achievable ~~should be applied using a graded approach based~~ should consider ~~on the~~ potential hazard of the research reactor, and its characteristics such as the inventory of fission products and the proximity to a population centre.	Please clarify. Doesn't the requirement for the design ("to ensure that doses to reactor personnel and the public are kept as low as reasonably achievable") have an element of grading ("reasonably achievable") already. Are the doses to reactor personnel and the public applied using a graded approach or are they one of the things that need to be taken into account when justifying the design solutions made by applying graded approach.		X Text now reads, "The requirement for the design to ensure that doses to reactor personnel and the public are kept as low as reasonably achievable should be applied using a graded approach considering the potential hazard of the…"		It proposed text for "The requirement… should consider…" is unclear. When the requirement is applied, then consideration of the reactor characteristics may be given.
106	NUSSC	Germany	60	6	5			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 be applied using a graded approach based on the potential hazard of the research reactor, and its characteristics such as the inventory of fission products and the proximity to a population centre. Specific design provisions, or SSCs included in the design to protect reactor personnel and the public from radiation, e.g. an emergency filtration system, could be larger and more complex for a research reactor with a high potential hazard.~~	The second sentence can be deleted. Applying the ALARA principle is a common practice in ra-diation protection. Ap-plying a graded ap-proach on the ALARA principle doesn't make any sense, because ALARA is already a method for optimising radiation protection. The example is mislead-ing, because the emer-gency filtration system is a measure of plant inter-nal accident manage-ment to mitigate conse-quences of an accident at a research reactor.			X	The text is consistent with SSR-3 para 6.8 which addresses large releases from accidents.
107	NUSSC	Germany	61	6	6			~~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.~~	This paragraph is so generic, it might apply to almost any requirement in SSR-3.			X	The paragraph states the requirement and serves as an introduction to the subsequent para which provides more specific guidance
108	NUSSC	Germany	62	6	7	4-6		The quantity of information that would be adequate to decommission a research reactor with a high potential hazard should be larger in scope than for research reactors with lower potential hazard, e.g. some low power reactors, critical and subcritical assemblies.	Please refer to the potential hazard not to the type of facility. It may be misleading.	X			
109		Belgium	3	6	9			The requirement to use defence in depth in the design of a research reactor, should be applied using a graded approach, recognizing that ~~many~~ for low power research reactors, or …	Sentence seems incorrectly structured. Delete "many"?	X			

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110	NUSSC	Germany	63	6	9			The requirement to use defence in depth in the design of a research reactor is a basic safety concept in nuclear safety and cannot be graded. Depending on the potential radiological hazard of a research reactor, the number levels of defence in depth can be graded~~, should be applied using a graded approach, recognizing that many 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. 2.12 of SSR-3 [1]) may not be physically possible~~.	The defence in depth concept is a basic safety concept in nuclear safety and cannot be graded. But the number of consecutive levels of defence in depth may be different for research reactors with low or high potential hazards. This should be clearly expressed.		X sentence added at beginning of para, "Defence in depth is an important design principle that is required for all research reactors regardless of potential hazard. The requirement to use...		Added text from old SSG-22 para 6.3
111	NUSSC	Germany	64	6	10			For a facility with a low and medium potential hazard, the first four ~~all five~~ levels of defence in depth may be included in the design, however the capability of the engineered safety features can use a graded approach, for example the decay heat load could be smaller, and typically a smaller fission product inventory needs to be confined or mitigated than for a research reactor with a high potential hazard.	Para 6.10 is conflicting with para 2.8. If no off-site consequences are possible, there is no need for implementing the fifth level of de-fence in depth. Also for a low potential hazard facilities accident scenarios more severe than design basis acci-dents should be postu-lated (DEC).	X			
112	NUSSC	Germany	65	6	12			The requirement is specifically for integration, and consequently ~~it~~ cannot be graded ~~applied using a graded approach~~.	To stronger emphasize that certain requirements cannot be graded			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
113	NUSSC	Japan	21	6	12			The 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 design in Requirements 42-66 and should be applied using a graded approach commensurate with the potential hazard of the facility.* N ~~Additional guidance on this topic is available in Ref. [24]~~ (footnote) Additional guidance on this topic is provided in IAEA-TECDOC-1801, Management of the Interface between Nuclear Safety and Security for Research Reactors (2016).	Those descriptions described in TECDOC are not consensus ones, and then move to footnote. Also. Delete Ref [24] from the list of REFERENCES.	X			
114		Republic of Korea	4	6	12	line 3		… of design in Requirement 42-66 of SSR-3[1](?) and should be applied …	The source of reference requirements is needed to be added.	X			
115	NUSSC	USA	21	6	12			…design in Requirements 42-66 of SSR-3 [1] and should…	Consistency with citations of other requirements of SSR-3.	X			
116	NUSSC	Germany	66	6	13			~~Use of the graded approach~~ ~~6.13. Requirements for the use of a graded approach are established in Requirement 12 of SSR-3 [1]:~~ ~~"The use of the graded approach in application of the safety requirements for a research reactor shall be com-mensurate with the potential hazard of the facility and shall be based on safety analysis and regulatory re-quirements".~~	This para is not necessary, because it is the scope of DS511. We propose to delete this paragraph including the headline above para 6.13.	X			

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117	NUSSC	Germany	67	6	13			Requirements for the use of a graded approach are established in Require-ment 12 of SSR-3 [1]: "The use of the graded approach in application of the safety requirements for a research reactor shall be com-mensurate with the potential hazard of the facility and shall be based on safety analysis and regulatory re-quirements".	Graded approach is an overall issue in context of this document. These Paras should be dis-cussed in Chapter 2. GENERAL CONSID-ERATIONS OF A GRADED APPROACH Moreover, these con-tains solely the citations of other IAEA Safety Documents. These should be commented in a way of recommenda-tions that can be derived from these.		X paras 6.13, 6.14 and their title have been deleted The subject is discussed in paras 2.5 and 1.9		
118	NUSSC	Germany	68	6	14			~~Further clarification is provided in para 6.18 of SSR-3 [1]: "The use of a graded approach in the application of the safety requirements shall not be considered as a means of waiving safety requirements and shall not compromise safety. Grading of the application of requirements shall be justified and supported by safety analysis or engineering judgement". As stated in para 1.5, the scope of this Safety Guide includes recommendations for the application of the 90 Requirements contained in SSR-3 [1], using a graded approach.~~	This para is not necessary, because it is the scope of DS511. We propose to delete this paragraph.	X			
119	RASSC	Germany	124	6	16			The requirement to design items important to safety in accordance with relevant codes and standards, can be applied using a graded approach, and following the detailed requirements in paras 6.19-6.24 of SSR-3 [1]. ~~For example, when no appropriate code or standard is available or when there is a departure from established engineering practice.~~	Delete this sentence. An example for that is given in the following para 6.17.			X	This sentence is introducing the two examples provided in the following two paragraphs
120	NUSSC	Japan	22	6	17			In the case of SSCs for which there are no established codes or standards, SSR-3 [1] allows the use of related standards or the results of experience, tests or analysis, and requires that such an approach is justified. A graded approach can be used in the application of this requirement, based on 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. Expert ~~judgement is~~ advices may be necessary in using this approach and its adoption should be documented as part of the required written justification, which should be cleared by safety committee.	Adoption of expert advices should be authorized by third person (safety committee).		X Expert judgement is necessary in using this approach and should be documented as part of the required written justification, and approved in accordance with a process in the management system.		Instead of prescribing a specific approval mechanism (the safety committee), the updated text recommends that a management system process is established to ensure appropriate approval. This is consistent with SSR-3 6.23 for departures from engineering practice
121	NUSSC	Germany	69	6	20			The requirement for items important to safety to perform according to specification cannot be graded ~~applied using a graded approach~~, and the ability of those SSCs to function as designed cannot be compromised by the manufacturing, construction and installation processes.	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
122	NUSSC	Germany	70	6	21	till 6.23		To be deleted	Today, the minimization of radioactive waste and features to facilitate decommissioning, can be considered as basic design principle. Minimization is always an optimization process which does not require any further grading, because it is intrinsic to this process. The same is true for later decommissioning. It results manly from the neutron fields and the expected radioactive inventory.			X	For member states without an established nuclear infrastructure it is important to include guidance on all the topics in SSR-3. The final sentence has been updated to read, " The level of detail of the characterization of the hazard to be included in the decommissioning plan, should be commensurate with the magnitude of the hazard, using a graded approach."
123	NUSSC	USA	22	6	22	last sentence		The level of detail of the characterization of the hazard ~~should~~ to be included in the decommissioning plan should be commensurate with the magnitude of the hazard using a graded approach.	As written, the sentence provides general guidance that is not specific to using a graded approach.	X			

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124		Republic of Korea	5	6	23	Line 1		In addition to the original reactor design, this guidance applies to modifications made, and new experiments undertaken, during its operation. For example, this requirement could be applied using graded approach to the choice of material used in the design of new experimental equipment based on the potential hazard introduced for waste management and decommissioning.	The term 'this guidance' is stated in the first sentence of the section 6.23, whereas the term 'this requirement' is used in the following sentence. Therefore, it is necessary to check that the term 'this guidance' is appropriate.		X Text now reads, "In addition to the original reactor design, this requirement applies to modifications made, and..."		
125	NUSSC	Germany	71	6	24			Requirements for the safety classification of structures, systems and components are established in Requirement 16 of SSR-3 [1]. This requirement cannot be graded. The method for determining the safety significance of SSCs should be based on deterministic methods, complemented by probabilistic methods and engineering judgement (see para 2.5).	Safety classification is an essential part of the design phase. As the safety class depends on the categorization of the safety functions to be fulfilled, which is based on the safety signifi-cance, a further grading is not necessary here. Also to be consistent with para. 6.25. Please add further in-formation on determin-ing the safety signifi-cance of SSCs. This a very important issue and cannot be omitted. (Compare with SSG-22, 6.9.)		X Para 6.23 (was para 6.25) has been revised, "All research reactors regardless of the potential hazard are required to classify the SSCs important to safety. The method for determining the safety significance of SSCs should be based on deterministic methods, complemented by probabilistic methods and engineering judgement...."		
126	NUSSC	Germany	72	6	27				"the other elements of this requirements" leaves ambiguities. Please specify explicitly the elements which cannot be graded.		X Text now reads, "Although it is not possible to apply the requirements in para 6.34 of SSR-3 [1] using a graded approach..."		
127	NUSSC	Japan	23	6	27			Although it is not possible to apply the other elements of this requirement 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 its performance meets acceptance criteria, due to the ~~smaller~~ low potential hazard of the facility.	To keep a consistency with para. 2.8.	X			
128	NUSSC	Germany	73	6	29			The requirement to identify the postulated initiating events cannot be graded ~~applied using a graded approach~~. (…)	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
129	NUSSC	USA	23	6	29			…using current safety standards and operational experience, including operational experience from similar facilities.	Operational experience from similar facilities can be used to develop the list of relevant postulated initiating events, especially for a new research reactor without operational experience of its own.	X			
130	NUSSC	Germany	74	6	30			The analysis of the set of postulated initiating events should be commensurate with the hazard and complexity of the facility. ~~Some postulated initiating events are not applicable to some research reactors according to the facility design, site characterization, and potential hazard.~~ A graded approach can be used in the safety analysis that follows from the initiating events. The scope and level of detail of the safety analysis should be commensurate with the characteristics of the design and the potential hazard of the facility (see paras 6.93-6.98).	The second sentence should be deleted, because it is conflicting with the second sentence of para 6.29. Always, a plant specific list of postulated initating events has to be established, taking design and site-specific events into account.	X			

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131	NUSSC	Germany	75	6	34			The requirement to identify a set of design basis accidents based on postulated initiating events (see para 6.28) cannot be graded ~~applied using a graded approach~~. (…)	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
132	NUSSC	USA	24	6	36	and 37		Move the last sentence of 6.36 to the beginning of 6.37: "One aspect of this requirement which can be applied using a graded approach is the degree of conservatism included in design limits."	Paragraph 6.37 discusses conservatism in the design limits and the last sentence of 6.36 fits better as the opening sentence of the paragraph.	X			
133	NUSSC	USA	25	6	38			"The use of design extension conditions as part of the safety analysis for a research reactor can use a graded approach for safety analysis as discussed in para 6.~~39~~93." If paragraph 6.39 is the correct reference, suggest eliminating the above sentence and combining paragraphs 6.38 and 6.39.	Paragraph 6.93 of DS511 is a quotation from SSR-3 and does not discuss design extension conditions or use of a graded approach for safety analysis.		X Text now reads, "The ~~use~~ inclusion of design extension conditions ~~as part of~~ in the safety analysis for a research reactor can use ~~a~~ the overall graded approach for safety analysis as discussed in paras 6.93 - 6.98."		
134	EPReSC	Iran	2	6	39			":..accident management procedures to the existing ~~emergency preparedness programme~~ emergency plans and procedures."	To be in line with the concepts and terminology of GSR Part 7 and SSR-3.	X			
135	NUSSC	Japan	24	6	41			A research reactor with a high potential hazard including a large cooling system, could require specific engineered safety features to mitigate internal flooding caused by a leak of secondary coolant. Such a facility could also require an emergency core cooling system to collect and recirculate primary coolant inventory in response to a loss of primary coolant accident.	(i) Please clarify why actuation of engineered safety features is required against internal flooding caused by a leak of secondary coolant. Addition of "primary" is to clarify the meaning.			X	Some research reactors include engineered safety features to prevent damage to safety systems in the event of an internal flood. (no change has been made to the text) "Loss of coolant accident" is standard terminology in Safety Guides and consistent with the IAEA safety glossary.
136	NUSSC	Germany	76	6	45			Where automatic or passive perfor-mance of a safety function is re-quired or an inherent safety feature is used, a minimum requirement for the reliability of the associated SSC should be established and main-tained. ~~Depending on the type of the research reactor, performance of one or more of the following safety func-tions may need to be automatic e.g. reactor shutdown, initiation of emer-gency core cooling, and confinement of radioactive material.~~ To ensure the required reliability one of the following design principles may be applied using a graded approach.	To establish a link to the following design princi-ples: •single failure criterion; •common cause fail-ures; •physical separation and independence of safety systems; •fail-safe design; •qualification of items important to safety.		X Sentence added to end of paragraph, "To ensure the required reliability one of the following design principles may be applied: single failure criterion, design for common cause failures, physical separation and independence, fail-safe design, qualification of items important to safety. These are discussed in the following sections."		Not all design principles can be applied using a graded approach No text was deleted from the para.
137	NUSSC	Germany	77	6	47			The requirement that no single failure prevents SSCs in a safety group from performing a main safety function, cannot be graded ~~applied using a graded approach~~. The groups of equipment delivering any one of the main safety functions are required to be designed with redundancy, independence and diversity to ensure high reliability. The required degree of redundancy can be graded and may be lower for a low hazard potential.	The degree of redundancy may lower for a low potential hazard facility than for a high potential hazard facility.		X Text added at the end of the para, "The required degree of redundancy should be lower for a research reactor with a low potential hazard, while still resulting in sufficient reliability to demonstrate that acceptance criteria are met."		The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide

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138		Belgium	4	6	49			Because the objective of the requirement is to achieve the necessary reliability, the requirement cannot be applied using a graded approach. ~~for example, in the design of a safety system~~.	In 6.47, the argument of reliability is used to say that a graded approach is not allowed for the single failure criterion (SFC). Then (using again the argument of reliability) it should also not be allowed for common cause failures. Otherwise, the benefit of applying the SFC can easily be lost, by paying insufficient attention to common cause failures.		X Para 4.49 was intended to emphasise the word "necessary" not "reliability". Text has been reworded to clarify, "Because the objective of the requirement is to achieve a level of reliability necessary to ensure safe operation, the requirement can be applied using a graded approach..."		The application of the single failure criterion is a binary choice either it is is applied or not. CCF can be addressed in the design to a greater or lesser extent.
139	NUSSC	Germany	78	6	49			~~Because the objective of the requirement is to achieve the necessary reliability, the requirement can be applied using a graded approach for example in the design of a safety system.~~	The justification is strange. The objective is to have necessary reliability and this necessary reliability should be graded?			X	This para has been combined with the subsequent para as they discuss a single topic and provide and example. Usually where requirements are stated "as necessary" it enables the deisgner to choose how to comply. In the example given a high hazard facility may require greater levels of diversity, redundancy and physical separation to achieve sufficient reliability and meet the acceptance criteria, than a low hazard facility.
140	NUSSC	Germany	79	6	50			For a research reactor with a high potential hazard, where a design basis accident combined with the failure of emergency ventilation could result in off-site radiological consequences, to meet the acceptance criteria for the safety analysis, the design of the emergency ventilation system could exclude low-probability common cause failures through the use of diversity ~~redundancy~~ and physical separation, whereas for a research reactor with a lower potential hazard, the acceptance criteria may be met using a design with simple redundancy of SSCs.	Common cause failures are addressed by applying the principle of diversity in the design of redundant SSCs. It should be clearly stated that diversity is meant here. Redundancy is the response to a postulated single failure. Depending on the potential hazard of the research reactor, the degree of diversity to be applied may be graded.		X Text now reads, "...through the use of diversity, redundancy and physical separation, ..."		
141	NUSSC	Japan	25	6	50			For a research reactor with a high potential hazard, where a design basis accident combined with the failure of emergency ventilation could result in off-site radiological consequences, to meet the acceptance criteria for the safety analysis, the design of the emergency ventilation system could exclude low-probability common cause failures through the use of redundancy and physical separation, whereas for a research reactor with a lower potential hazard, the acceptance criteria may be met using a design with simple redundancy of SSCs.	Please clarify difference between "research reactor (facility) with a low potential hazard" and "research reactor (facility) with a lower potential hazard".		X Text now reads, "...whereas for a research reactor with a low potential hazard, ..."		
142	NUSSC	Germany	80	6	54			The requirement for the use of fail-safe design features cannot be graded ~~applied using a graded approach. However, the requirement specifies the use of these design features 'as appropriate'. Engineering judgement should be 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.~~	A fail safe design is an important design princi-ple and should always be applied. In some cas-es it may not clear for a certain SSC which func-tion would be preferred to reach a safe state. (E.g. in some cases fail safe means closing a valve and for other cas-es the same valve should remain open). Para. 6.54 does not pro-vide more guidance with respect to the use of the graded approach.		X Text now reads, "The requirement for the use of fail-safe design features cannot be applied using a graded approach. ~~However, the requirement specifies the use of these design features 'as appropriate'.~~ However engineering judgement should be applied, ..." The remainder of the paragraph is retained		Sentence deleted No further guidance can be included other than applying engineering judgement based on the acceptance criteria of the safety analysis, without providing overly detailed guidance. The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
143	NUSSC	USA	26	6	62			The design of a research reactor should accommodate the need for maintenance and testing of components during operation based on the reliability requirements of the SSC and its safety significance as well as the potential hazard of the facility; consistent with manufacturer's recommendations and operating history.	Stating that maintenance and testing can occur whenever lower risk research reactors are shut down does not necessarily account for recommended periodicities. Suggest additional text to reflect recommended periodicity, unless it can be based on historical data.	X			

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144	NUSSC	Germany	81	6	63			The storage and use of spare parts of item important to safety for maintenance is an aspect of this requirement that can be applied using a graded approach, while meeting the requirements of applicable national codes and standards and conditions (e.g. admissible repair time) specified in the licence and operational limits and conditions (OLCs). For a research reactor with a high potential hazard, spare parts for some SSCs important to safety could be required to meet the national standards for nuclear power plants, including requirements for procurement and storage. ~~In a research reactor of any level of potential hazard, spare parts for maintenance of a system not important to safety should be procured and stored following good engineering practice.~~	The last sentence is not related to safety and can be deleted. In case a missing spare part of an operational system is missing, the research reactor should be shut down and remain in a safe state. It should be more em-phasized, that spare part for items important to safety are addressed here. In addition, the link to licence conditions and OLCs should be added.		X Text now reads, "The storage and use of spare parts for maintenance of items important to safety is an aspect of this requirement that can be applied using a graded approach, while meeting the requirements of applicable national codes and standards and regulatory conditions (e.g. admissible repair time) specified in the authorization and operational limits and conditions (OLCs). For a research reactor with a high potential hazard, spare parts for some SSCs important to safety could be required to meet the national standards for nuclear power plants, including requirements for procurement and storage."		Editorial Final sentence deleted
145	NUSSC	USA	27	6	63			For a research reactor with a high potential hazard, spare parts for some SSCs important to safety could be required to meet the national standards ~~for nuclear power plants~~, including requirements for procurement and storage.	Suggest removing reference to nuclear power plants as likely not generically applicable to research reactors; instead suggest leaving the reference to standards.			X	Recommending the use of guidance for NPPs for research reactors with a high potential hazard is included in Section 1 of several research reactor safety guides
146	EPReSC	Germany	120	6	64			There are two steps in determining the provision for maintanance, periodic testing and inspection, ~~testing and maintenance:~~	To be commensurate with the order of measures used in paragraph 7.2 of SSR-3.	X			
147	NUSSC	Germany	82	6	66			The aspect of this requirement to meet national requirements for emer-gency preparedness cannot be graded ~~applied using a graded approach. A graded approach can be used for ap-plying other aspects of this require-ment however, including:~~ ~~– the design of the escape routes and the location where personnel assem-ble;~~ ~~– the design of the communication system used within the facility during an emergency.~~	As stated, requirement 32 of SSR-3 cannot be graded. This requirement is formulated in a very general manner and thus discussing a further grading is not necessary.			X	The text is providing guidance on the implementation of paras 6.90 and 6.91 from SSR-3. While compliance with national requirements cannot use a graded approach, escape routes and communication systems can. The two bullets introduce the following two paragraphs. The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
148	EPReSC	Iran	3	6	66				This paragraph needs clarification. It is not quite understandable.		X Text now reads, "The requirement for escape routes to meet national requirements for emergency preparedness cannot be applied using a graded approach."		The word "aspect" was deleted to improve clarity
149	NUSSC	Germany	83	6	67	+6.68		To be deleted	Both paras do not contain any guidance on applying a graded approach. As requirement 32 of SSR-3 has to be fulfilled and cannot be graded as stated in para. 6.66, there is no need to discuss this topic further.			X	Para 6.66 identifies in bullet points two aspects of the requirement which can be applied using a graded approach. Para 6.67 and 6.68 provide additional guidance on the two bullets.
150	EPReSC	Iran	4	6	67			"…where personnel assemble could need specific design features to protect personnel from ~~on-site~~ hazards during an emergency.	Why only on-site hazards?	X			
151	NUSSC	USA	28	6	67			…and emergency routes ~~would be simple to~~ could use simpler designs.	To clarify that the design, and not the design process, could be simpler than for emergency routes at a high consequence facility.	X			
152	WASSC	Germany	132	6	69			Higher power level, pool type research reactors that allow for easy access and underwater handling of the core components may require design provisions for disassembling the reactor under the water. Radioactive waste storage and disposal facilities will be an important consideration.	Also, storage facilities are important, especially when there is no disposal facility available.	X			

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153	RASSC	Germany	125	6	75			Requirements for radiation protection (see para 6.5) and radioactive waste management (see paras 6.21 – 6.23) …	Not limited to 6.21	X			
154	NUSSC	Germany	84	6	79	second bullet		rewrite	The first sentence states that experiments with an impact on safety need to fulfill the same require-ments as the RR itself. In the second sentence this is retracted. SSG 24/DS509B intro-duces a 4-stage classifi-cation system for modi-fication is introduced with the possibility to apply a		X Text now reads, "New utilization and modification projects, including experiments ~~having an impact on~~which have a major significance for safety, are subject to safety		Text has been revised as suggested and refers to the following para (old para 6.80) where the 4-stage classification system is described.
155	NUSSC	Germany	85	6	79	last bullet		~~Protection systems for experiments are designed to protect the experiment and the reactor~~	This is an obvious statement and here not related to any application of a graded approach.		X Text now reads, "Protection systems for experiments are designed to		The original text was insufficient. The bullet list is describing the elements of Requirement 36. Omitting the final item would leave
156	RASSC	Germany	126	6	79	last bullet		Protection systems for experiments are designed to protect the experiment and the reactor. …	For the previous sentences, a statement was made as to whether a graded approach can be applied. Please add this for this sentence as well.	X			Text now reads, "Protection systems for experiments are designed to protect the experiment and the reactor. This requirement cannot be applied using a graded approach. The system must protect both the experiment and the reactor."
157		Belgium	5	6	80			… For a modification categorized as a 'significant effect on safety', the existing safety analysis and authorization remain valid, but a change is required in the operating limits and conditions for the research reactor. In such cases, analysis is required to demonstrate that validity of the existing safety analysis report, and to justify the change in the OLCs. That analysis should be approved by the reactor manager and the regulatory body before the	Since OLCs are part of the SAR, approval by the regulatory body is also needed.		X Text now reads, "That analysis should be reviewed by the safety committee and approved by the reactor manager before the design process proceeds. New or modified OLCs are required to be reviewed and approved by the regulatory body prior to commencement of operation with the modification or new experiment (see para 7.33 of SSR-3 [1])."		More than one reviewer provided comments on this para
158	NUSSC	Germany	86	6	80			DS510B [11] provides recommendations for designing and implementing new experiments or modifications at a research reactor. The guidance includes the use of a categorization process to determine the safety significance of the experiment or modification.~~,~~ ~~for the use of a graded approach in the application of this requirement. For a modification that is categorized as a 'major effect on safety', the operating organization is required to update the safety analysis for the research reactor and, as applicable, seek authorization from the regulatory body. The analysis of the modification should be reviewed by the safety committee and the regulatory body. For a modification categorized as a 'significant effect on safety', the existing safety analysis and authorization remain valid, but a change is required in the operating limits and conditions for the research reactor. In such cases, analysis is required to demonstrate that validity of the existing safety analysis report, and to justify the change in the OLCs. That analysis should be approved by the reactor manager before the design process can proceed. Modifications categorized as 'minor' or 'no effect on safety' have reduced recommendations for analysis and approval.~~	A reference to DS510B is sufficient, because this guide describes in detail the necessary steps to deal with modifications based on the safety significance. No further guidance with respect to the application of a graded approach is necessary.			X	A short description of the approach in DS510B will help the reader to understand the scope of the guidance given in that document.
159	NUSSC	Japan	26	6	80			DS510B [11] provides recommendations for designing and implementing new experiments or modifications at a research reactor. The guidance includes Paras 3.7 – 3.12 provide the use of a	For user-friendliness to add numbers of referred paragraphs. Also, it is preferable to provide the definitions of 'major effect		X reference to the specific paras has been added to the text		Use of a footnote is not appropriate. The information is available in the referenced Safety Guide
160	NUSSC	USA	29	6	80			In such cases, analysis is required to demonstrate that validity of the existing safety analysis report, and to justify the change in the OLCs and the new or modified OLCs shall be reviewed and approved by the regulatory body prior to commencement of operation with the modification or new experiment.	As required by SSR-3 paragraph 7.33, operational limits and conditions shall be submitted to the regulatory body for review, assessment and approval before the commencement of operation.		X New sentence added, "New or modified OLCs are required to be reviewed and approved by the regulatory body prior to commencement of operation with the modification or new experiment (see para 7.33 of SSR-3 [1])."		Safety Guides do not use "shall" unless it is in a quote from a requirements document.
161	RASSC	Germany	127	6	82			… Further recommendations on the use of a graded approach in the application of the requirement for a commissioning programme is given in paras 7.29 – 7.33. …	Not limited to 7.29	X			

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162	NUSSC	Japan	27	6	84			For a research reactor with a medium or low potential hazard, the ageing management programme, during the operation phase of the facility, should include a smaller number of items for monitoring, and fewer ageing management activities than the programme in a facility with a high potential hazard which typically has more SSCs important to safety. A design with less-accessible SSCs could be acceptable providing the programme is able to verify the condition of all items important to safety and ensure the required safety functions remain available. A graded approach can be used in the application of this requirement in such a facility, based on the safety classification of SSCs, and the expert ~~judgement~~ advices with clearance by safety committee.	Application of a graded approach should be based on objective criteria. An expert judgement is less objective and also adoption of expert advices needs an authorization by safety committee. (See comment No. 3.)		X The principle that expert judgement is subject to appropriate review and approval, from the safety committee or the reactor manager, has been added in para 2.5 as it applies broadly to the use of a graded approach. Para 2.5 now reads, "...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 approval using a process in the management system..."		The comment that expert judgement requires appropriate approval applies to more than just this para.
163	NUSSC	Japan	28	6	87			Research reactor designs normally include provisions necessary to ensure safety during shutdown of the facility and these provisions can typically be used during a long shutdown [nn3]. A graded approach can be used in the application of this requirement. For all SSCs that are important to safety and which could suffer some degradation during the extended shutdown period [nn3], provision should be made for inspection, testing, maintaining, dismounting and disassembling during the shutdown period. (footnote nn3) A research reactor in extended shutdown is one that is no longer operating, with no decision on its decommissioning, and where there is no clear decision about the future of the reactor as to whether it will be brought back into operation or decommissioned. Long shutdown periods for maintenance or for implementation of refurbishment and modification projects are not considered an extended shutdown state.	User-friendliness. Suggested to explain a difference between long shutdown and extended shutdown period, with referring to the footnote 48 of SSR-3.			X	To help readability, the number of footnotes in Safety Guides is being reduced. The information is available in SSR-3
164	NUSSC	USA	30	6	87			Add the following sentence to the end of the paragraph: All modifications made to the facility for the purpose of extended shutdown should be made in accordance with Requirements 36 and 83 of SSR-3, including review, assessment and approval by the regulatory body prior to implementation when appropriate.	For consistency with Requirements 36 and 83.		X Sentence added, "All modifications made to the facility due to extended shutdown are subject to Requirements 36 and 83 of SSR-3 [1], including review, assessment and approval by the regulatory body prior to implementation when appropriate."		When referring to requirements, Safety Guides cannot use the word "should".
165	NUSSC	USA	31	6	88			OLCs could be implemented, after review, assessment and approval by the regulatory body, to prevent criticality safety events, and maintain the fuel assemblies in conditions where their integrity can be monitored and maintained.	As required by SSR-3 paragraph 7.33, operational limits and conditions shall be submitted to the regulatory body for review, assessment and approval before the commencement of operation.	X			
166	NUSSC	Germany	87	6	90			This requirement cannot be graded ~~applied using a graded approach~~ because preventing unauthorized access to nuclear facilities is a common requirement regardless of the size or potential hazard of the research reactor. However, the security measures to be implemented can be applied using a graded approach. Access controls are required for operating personnel and experimenters in the facility, (…)	We agree that Requirement 40 of SSR-3 cannot be graded. However, the security measures implemented in a low, medium and high potential hazard facility can be graded. Whereas in a low potential hazard locked doors and installation of an intrusion detection system may be sufficient, a high potential hazard facility operated with HEU may require permanent armed security forces.		X Text added to the end of the paragraph, "A graded approach should be used in the application of security recommendations where applicable."		Text modified for consistency with nuclear security terminology (see also para 9.2)
167	NUSSC	Germany	88	6	90			A major objective of access control is to prevent the unauthorized removal of nuclear material. Research reactors with a low potential hazard and a low inventory of fission products in irradiated fuel assemblies such as some low power research reactors, critical and subcritical assemblies, should include specific design features for access control for those fuel assemblies.	Also low power reactors have usually low potential hazard. Referring only to critical and subcritical assemblies is not correct.			X	The language "such as" denotes that the examples do not include every type of low hazard facility.
168	EPReSC	Iran	5	6	90			"Access controls are required for ~~operating personnel and experimenters in the facility, as well as members of the public or other external personnel such as those involved in emergency response~~ operating personnel, other personnel involved in the operation or use of the reactor (e.g. technical support personnel and experimenters), as well as the public, and emergency workers."	According to paragraph 4.15 of SSR-3, external personnel includes supplies and experimenters. Please take into consideration paragraph 6.116 of SSR-3.	X			

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169	NUSSC	Germany	89	6	92			These requirements cannot be graded ~~applied using a graded approach~~ because this evaluation is necessary for research reactors regardless of potential hazard. (…)	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
170	NUSSC	Germany	90	6	94			The requirements in paras 6.119-6.125 of SSR-3 [1] include several aspects that cannot be graded ~~applied using a graded approach~~.	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
171	NUSSC	France	3	6	97			... Other examples of a graded approach include: - Analysis may demonstrate that for some identified postulated initiating events the potential for a release of radioactive material from the core is physically impossible (or, at least, extremely unlikely with a high degree of confidence) ~~practically eliminated~~, which would remove the need for extensive engineered safety features and analysis of their failure.	This use of the concept of practical elimination is not consistent with SSR-3.		X Text now reads, "- Analysis may demonstrate that for some identified postulated initiating events the potential for a release of radioactive material from the core is ~~practically eliminated~~ physically impossible (or can be considered with a high level of confidence to be extremely unlikely),"		Text taken from SSR-3 6.8
172	NUSSC	Japan	29	6	97			~~The scope and depth of the safety analysis should be based on the potential hazard of the facility, as discussed in para 1.3 and annex I of Ref. [26].~~ The appendix of DS510A [10] provides recommendations on … ~~[26] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Analysis for Research Reactors, Safety Report Series No. 55, IAEA, Vienna (2008).~~	Ref. [26] (Safety Report Series No. 55) is not consensus document, and then deleted from main text. Also, delete Ref [26] from list of REFERENCES.			X	It is permissible to reference safety reports in Safety Guides. SRS No. 55 provides useful additional recommendations on the use of a graded approach in safety analysis
173	NUSSC	Japan	30	6	97			The use of conservative methods and criteria is a means of simplifying the safety analysis. Facilities with ~~small~~ low potential hazard may use conservative criteria in safety analysis, with low impact on the facility design and operation or cost.	To keep a consistency with para. 2.8.	X			
174	NUSSC	Germany	91	6	100			~~A graded approach can be used for the design of shielding throughout the facility, based on the number of rooms in the building where SSCs could be a source of radiation under operational states or accident conditions, and the characteristics of the radiation risk. The buildings and structures should be designed to maintain radiation levels as low as reasonably achievable. For a research reactor with a high potential hazard, a larger number of rooms where equipment associated with reactor operation, isotope production, experimental devices or radioactive waste storage could require shielding as part of the building design. In a facility with a lower potential hazard, with a small number of rooms where a radiation risk is present, the design of structures to provide adequate shielding could be less complex.~~	No graded approach can be applied to the design of shielding. The admissible dose rate defines the necessary shielding during the design phase considering the application of the ALARA principle. For that reason, we propose to delete 6.100 as it contains no further guidance on the application of the graded approach.			X	Shielding design should not be uniform for research reactors of all levels of hazard, but will be dependent on the type of radiation hazard, its intensity and combinations of radiation hazard that may exist in normal operation and accident conditions.
175	NUSSC	Germany	92	6	101	second dash		~~Up-to-date site evaluation can help to reduce excessive conservatism in engineering requirements for buildings and structures to ensure protection against external events, which may have a high impact on the total cost of the reactor facility (see section 2.2.1 of Ref. [26]).~~	Avoiding excessive conservatism or reducing costs is not a safety-oriented aspect and should be deleted here. This is not on grading safety requirements but on design optimization.		X Text now reads, "Up-to-date site evaluation can help to reduce excessive conservatism in engineering requirements for buildings and structures to ensure protection against external events, (see section 2.2.1 of Ref. [26])."		The statement about reducing costs has been removed. The level of conservatism is a consideration in the use of graded approach.
176	NUSSC	Japan	31	6	101			Separation of areas according to their potential radiological hazard can minimize the need for radioactive waste handling, contribute to design for radiation protection, design for emergency preparedness and response, and design for fire protection~~, and help to reduce operational costs~~.	It is not suitable to describe reduction of operational cost in Safety Guide.	X			

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177	NUSSC	Japan	32	6	101			Up-to-date site evaluation can help to reduce excessive conservatism in engineering requirements for buildings and structures to ensure protection against external events~~, which may have a high impact on the total cost of the reactor facility (see section 2.2.1 of Ref. [26])~~.	Ditto on deletion of cost-related description. Also, Ref [26] (Safety Report Series No. 55) is not consensus document, and then deleted from main text.	X			
178	NUSSC	Netherlands	2	6	103			6.103. For a research reactor with a high potential hazard, safety analysis may demonstrate the need for a confinement system which includes a pressure-retaining containment structure (see footnote 25 in SSR-3 [1]) surrounding the research reactor including airlocks for personnel and equipment to enter and exit. This in case accidents could result in high pressures inside the confinement that would otherwise result in unacceptable releases to the environment. The necessary reliability of the safety functions performed by those SSCs is determined by the acceptance criteria for off-site consequences under design basis accidents and selected design extension conditions. For a facility with a medium or low potential hazard, the reactor building could be designed without a pressure-retaining function, but with a ventilation system with features to prevent or mitigate radioactive releases, and meet the acceptance criteria. The basic design requirement is to ensure that a release to the environment does not exceed acceptable limits for all accidents taken into account in the design. The results of safety analysis should be used to determine how and to what extent the design of the means of confinement can be graded, e.g. whether volatile fission product (e.g. iodine) traps are necessary in the event of a release of fission products from the reactor.	Improve clarity. The present text could be interpreted as that for RR with high potential hazard a pressure-retaining confinement system is always needed (even though the text states “may”). This is not always the case. The need for a pressure-retaining confinement system should always be demonstrated by a safety analysis. The goal of the requirements for design is well described in SGG-22, par 6.46. We suggest to include, for clarity, part of the paragraph.		X First sentence changed to, "For research reactors with a high potential hazard, in some cases safety analysis might demonstrate the need for a confinement system which includes a pressure-retaining containment structure (see footnote 25 in SSR-3 [1]) to meet the acceptance criteria." The following sentence has been added to the end of the para, "In all cases, the results of safety analysis should be used to determine how a graded approach is used in the design of the means of confinement, e.g. whether iodine traps are necessary in the event of a release of fission products from the reactor."		The text from the original para 6.46 was added, but adjusted for consistency with the language used throughout the new version, and the repeated "e.g." was simplified.
179	NUSSC	USA	32	6	103			…a ventilation system with features to ~~prevent~~ control or mitigate radioactive releases, and meet the acceptance criteria	It is unclear how the ventilation system would prevent releases if the building doesn’t have a pressure retaining function. Typically such a building would prevent uncontrolled releases, but not prevent releases entirely.	X			
180	NUSSC	Germany	93	6	107			Requirements for the provision of reactivity control are established in Requirement 45 of SSR-3 [1]. Reactivity control is one of the main safety functions. The application of the requirements for reactivity control cannot be graded ~~use a graded approach~~. Adequate reactivity control is required for all research reactor designs. Further recommendations on requirements for the main safety functions are provided in para 6.4.	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
181	NUSSC	Japan	33	6	110			A graded approach can be used when determining how many redundant shutdown channels are necessary and the extent of instrumentation required for monitoring the state of the shutdown system [nn4] ~~(see section 3 of Ref. [26])~~. (footnote nn4) some information may be found in Safety Report Series No. 55, Safety Analysis for Research Reactors, , IAEA, Vienna (2008). *Also, delete Ref[26] from REFERENCES.*	Ref.[26] (Safety Report Series No. 55) is not consensus document, and then deleted from main text.		X Text now reads, "A graded approach can be used when determining how many redundant shutdown channels are necessary, how redundant channels will be credited in the safety analysis (see section 3 of Ref. [26]), and the extent of instrumentation required for monitoring the state of the shutdown system, based on the potential hazard of the facility."		It is permissible to reference safety reports in Safety Guides. SRS No. 55 provides useful additional recommendations on the use of a graded approach in safety analysis
182	NUSSC	Germany	94	6	111			~~The need for a second, independent shutdown system is required to be considered for research reactors, dependent on characteristics such as experiments with major safety significance that could affect, in the event of an accident, the first shutdown system, unless inherent self-limiting properties of the design of the core or fuel would prevent a damaging reactivity excursion under all foreseeable reactor states.~~	The reason for a second, independent shutdown system is to ensure achieving a safe state in case of a common cause/mode failure of the fist shutdown system. This requirement is not related to the safety significance of any experimental facility. Inherent self-limiting core characteristics are important to control reactivity induced accidents (RAI) to avoid unacceptable power excursions. As 6.111 is not related to the graded approach we propose to delete 6.111.	X			

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183	NUSSC	Japan	34	6	113			Removal of heat from the reactor is one of the main safety functions. The coolant system is required to be designed to provide adequate cooling to the reactor with an acceptable and demonstrated margin. Adequate cooling is required not only during normal operation at the authorized power levels, but also after shutdown, under a range of anticipated operational occurrences and accident conditions that involve loss of flow or loss of coolant transients. ~~A graded approach can be used in the design of the cooling system.~~ The coolant system can range from the provision of forced cooling with emergency electrical power being available to power some or all of the main coolant pumps, to no emergency power for any of the coolant pumps, to a system where natural convection cooling is used for both heat removal under full power operation as well as decay heat removal. Cooling by natural convection might be adequate for some small research reactors	Method to remove the heat from reactor core is selected in accordance with the amount of heat generated in core, and then this is design choice rather than graded approach.			X	The design of a cooling system will not be identical for every research reactor, as such that represents a graded approach to the application of the requirement to "provide adequate cooling to the reactor core".
184	NUSSC	Germany	95	6	115			The requirement to monitor and control the properties of the reactor coolant (e.g. the pH and conductivity) is also applicable to all water cooled research reactors of any power level including subcritical assemblies, to ensure that water conditions do not degrade reactor SSCs important to safety (see para 6.162 of SSR-3 [1].	This requirement is only relevant for water cooled reactors. In case of e.g. air-cooled polyethylene moderated research reactors, this requirement will not be applicable.	X			
185	NUSSC	USA	33	6	115			…to ensure that water conditions do not degrade reactor SSCs important to safety, especially boundaries that prevent the release of fission products, such as the fuel cladding	To emphasize that chemistry control is important to ensure retention of fission product regardless of the complexity of the facility.	X			
186	NUSSC	Germany	96	6	121			Alarms may be necessary at locations other than the control room to ensure personnel are aware of the status of the facility and take appropriate action. In a research reactor with a low potential hazard such as some low power reactors, critical and subcritical assemblies, there could be a small number of process parameters that necessitate audible or visual alarms located in the control room.	Also low power reactors have usually low potential hazard. Referring only to critical and subcritical assemblies is not correct.			X	The language "such as" denotes that the examples do not include every type of low hazard facility.
187	EPReSC	Iran	6	6	121			"…and ~~emergency preparedness and response planning~~ emergency plans and procedures…"	To be in line with the concepts and terminology of GSR Part 7 and SSR-3.			X	The number and location of alarms is assessed during the planning process, not in the plan document
188	NUSSC	Germany	97	6	126			(…) ~~Other aspects of the facility de-sign and location will affect the de-sign of the reactor protection system, for example:~~ ~~– At sites that could be affected by significant seismic events, a seismic sensor may be required to shut down the reactor, while at other sites with minimal seismic activity, such protec-tion would not be necessary.~~ ~~– Initiation of emergency core cool-ing may be necessary for certain re-actors, while in others it would not be necessary (see para 6.3 of this Safety Guide)~~	The last sentence of para 6.126 is not related to a graded approach. Thus, we propose to delete this sentence.			X	The two examples given illustrate the "corresponding reduced complexity" referred to earlier in the para
189	RASSC	Germany	128	6	126			Initiation of emergency core cooling may be necessary for certain reactors, while in others it would not be necessary (see para 6.3 6.4 (iii) (?) of this Safety Guide)	The reference to para 6.3 does not seem correct. Please check the reference.	X			Text now reads "6.4 (b) (iii)"
190	NUSSC	USA	34	6	126			The reactor protection system is required to automatically initiate the required protective actions for the full range of postulated initiating events to achieve a safe state and this cannot be applied using a graded approach. Aspects of how the protective function is achieved to meet the requirement~~This~~ can be applied using a graded approach, based on the potential hazard of the facility and the number of initiating events identified in the safety analysis.	As written, the guidance implies that the basic requirement to automatically shut down the reactor can be applied using a graded approach, meaning that low consequence facilities might not need such a system, which is not consistent with SSR-3.		X Text now reads, "The reactor protection system is required to automatically initiate the required protective actions for the full range of postulated initiating events to achieve a safe state. A reactor protection system is required for all research reactor designs regardless of potential hazard. This requirement can be applied using a graded approach..."		To avoid statements that appear to say the requirement can and cannot be applied using a graded approach, a clear statement of the requirement for a RPS has been added.
191	NUSSC	Germany	98	6	131	5-8		In a research reactor with a low potential hazard, such as some low power reactors, critical and subcritical assemblies, the safety analysis may not identify any conditions arising during design basis accidents which require additional protective elements in the control room.	Also low power reactors have usually low potential hazard. Referring only to critical and subcritical assemblies is not correct.			X	The language "such as" denotes that the examples do not include every type of low hazard facility.
192	NUSSC	Germany	99	6	140			Most reactors, irrespective of potential hazard ~~power level~~, should need, as a minimum, an emergency power supply for lighting […]	The thermal power is not a sufficient parameter for grading. In other paras. Grading should commensurate with hazard potential.	X			
193	NUSSC	Germany	100	6	141	last sentence		~~All of the sesystems are likely to be required for a research reactor,regardless of potential hazard.~~	This sentence gives the impression that the systems may not be graded. Yet 6.142 gives examples for grading some of these requirements.		X Text now reads, "Each of these systems should be considered in the design for a research reactor, regardless of potential hazard."		Updated text is consistent with following para on a graded approach.

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194		WNTI	1	6	147			6.147. SSR-6 (Rev. 1) [29] ~~provides information on~~ **includes** a graded approach to performance standards for package designs for the safe transport of radioactive material, and the appendix of TS-G-1.4 [30] provides detailed examples of a graded approach for all aspects of transport of radioactive material. (…)	Editorial. SSR-6 (Rev. 1) does not contain information but requirements.	X			
195	NUSSC	Japan	35	6	149			Requirements for fire protection systems are established in Requirement 61 of SSR-3 [1]. Requirements for fire protection systems can be applied using a graded approach based on the results of safety analysis, fire hazard analysis ~~or expert judgement,~~ while remaining in compliance with regulatory requirements. For example, fire protection systems are required to provide alarms and information on the location of fires. In a research reactor with a high potential hazard, the facility typically comprises a large number of rooms on different floors of the reactor building, whereas a research reactor with a low potential hazard could be located in a single reactor hall. Using a graded approach, based on the results of a fire hazard analysis and the layout of the facility, the information displayed by the fire protection system could vary in scope and complexity. ~~Compliance with national requirements for fire protection systems cannot be subject to a graded approach.~~	i) Application of a graded approach should be subject to objective criteria, furthermore, there is no room for expert judgement when remaining in compliance with regulatory requirements, as stated in following sentence. (See comment No. 3.) ii) Last sentence is covered by underlined sentence, and also, compliance with national requirements is not specific matter to this subject, then suggested to be deleted.		X "...based on the results of safety analysis, fire hazard analysis or expert judgement..." is consistent with SSR-3 6.18 has been retained. The final sentence has been deleted.		
196	NUSSC	Germany	101	6	150	last sentence		~~In all cases, the design of normal and emergency lighting systems in a research reactor must comply with regulatory requirements.~~	Obvious and expected for each and every regulatory requirement.	X			
197	NUSSC	Japan	36	6	150			Requirements for lighting systems are established in Requirement 62 of SSR-3 [1]. The requirement can be applied using a graded approach on the basis of safety analysis ~~and expert judgement~~. Safety analysis should identify….. ~~In all cases, the design of normal and emergency lighting systems in a research reactor must comply with regulatory requirements.~~	Ditto on expert judgement. (See comment No. 3.) Compliance with regulatory requirements is a matter of course.		X "...on the basis of safety analysis and expert judgement..." is consistent with SSR-3 6.18 has been retained. The final sentence has been deleted.		
198	NUSSC	Germany	102	6	151	second sentence		(…) The requirements in para 6.210 (a) to (e) in SSR-3 [1]) cannot be <u>graded</u> ~~applied using a graded approach~~. (…)	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
199	NUSSC	Japan	37	6	151			~~In addition, all lifting equipment in a research reactor must be designed in compliance with regulatory requirements and national codes and standards~~	Ditto.	X			
200		Belgium	6	6	152			… For a research reactor with a low potential hazard, based on the results of safety analysis, airborne radiation monitoring could be performed by periodic checks on an air filter, with no other special ventilation equipment could be needed in the design. …	The last part of the sentence (in red) seems incorrectly structured. Please rephrase.	X			Text now reads, "...with no other special ventilation equipment ~~could be~~ needed in the design."
201		Belgium	7	6	153			We propose to add an explicit quotation of Requirement 65 of SSR-3 (as done for many other Requirements) or to indicate the three parameters explicitly.	Otherwise, it cannot be understood what are the "three parameters" referenced in 6.153 (quality, flow rate and cleanness?)		X Text now reads, "...the design is required to specify the three parameters: quality , flow rate and cleanness; this requirement cannot be applied using a graded approach."		The three parameters have been added to this para.
202	NUSSC	Germany	103	6	153			Requirements for compressed air systems are established in Requirement 65 of SSR-3 [1]. For a compressed air system serving an item important to safety at a research reactor, the design is required to specify the three parameters; this requirement cannot be <u>graded</u> ~~applied using a graded approach~~.	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide
203	WASSC	Germany	133	6	153			Requirements for compressed air systems are established in Requirement 65 of SSR-3 [1]. For a compressed air system serving an item important to safety at a research reactor, the design is required to specify the three parameters; this requirement cannot be applied using a graded approach.	Please at least roughly explain which three parameters.	X			Text now reads, "...the design is required to specify three parameters: quality, flowrate and cleanness"

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204	NUSSC	Japan	38	6	153			Requirements for compressed air systems are established in Requirement 65 of SSR-3 [1]. For a compressed air system serving an item important to safety at a research reactor, the design is required to specify the three parameters; this requirement cannot be applied using a graded approach.	Please clarify "the three parameters" in the 3rd line of this paragraph. Otherwise, please describe whole sentence of Req.65.	X			Text now reads, "For a compressed air system serving an item important to safety at a research reactor, the design is required to specify three parameters: quality , flow rate and cleanness; this requirement cannot be applied using a graded approach."
205	NUSSC	Germany	104	6	157				Include a reference to the classification scheme introduced in SSG-24/DS510B.	X			Last sentence added, "Recommendations for a categorization process for experimental devices is provided in Section 3 of DS509A [11]."
206	NUSSC	USA	35	6	157			For the installation of a new experimental device where the potential hazard is high, and a failure of the experimental device represents a new initiating event outside the scope of the safety analysis report, a revision of the safety analysis report is required, ~~with a~~ and any necessary revision of the OLCs must be submitted to the regulatory body for review, assessment and approval prior to commencement of operation with the new experimental device~~eif applicable~~.	As required by SSR-3 paragraph 7.33, operational limits and conditions shall be submitted to the regulatory body for review, assessment and approval before the commencement of operation.	X			
207	RASSC	Germany	123	6					In section 6 sometimes the requirements of SSR-3 are quoted in full (e. g. para 6.2), sometimes not (e. g. para 6.5). For reasons of consistency and readability, it would be better if all requirements were cited in full.			X	When every requirement is repeated in full, the Safety Guide becomes much larger. An attempt has been made to balance the length of the document with providing sufficient specific detail where it is needed.
208	RASSC	Germany	129	7	8			(d) Training, retraining and qualification programmes (see paras 7.11 – 7.16 of this Safety Guide). (e) Operating procedures (see paras 7.34 – 7.38 of this Safety Guide). (f) Maintenance, periodic testing and inspection programmes (see paras 7.42 – 7.51 of this Safety Guide). (g) Emergency planning and procedures (see paras 7.63 – 7.67 of this Safety Guide). (h) The radiation protection programme (see paras 7.76 – 7.82 of this Safety Guide).	Not limited to paras (d) 7.11 (e) 7.34 (f) 7.42 (g) 7.63 (h) 7.76	X			
209		Republic of Korea	6	7	11	till 7.16		*~~Use of graded approach in training~~ Training , retraining and qualification of personnel*	The title for paras. 7.11 to 7.16 is needed to be changed by deleting the following phrase in order to match the title with it of the SSR-3. "Use of graded approach in"	X			
210	NUSSC	Germany	105	7	14			~~The required levels of education (e.g. post-graduate university degree, uni-versity degree, or technician qualification) and opera-tional experience (e.g. the minimum number of hours of operation per year) for the various staffing po-sitions could be subjected to use of a graded approach in accordance the above criteria.~~	The requirements for the education and training of the reactor manager should not be subject to grading.			X	Training and experience for reactor manager at a large high powered research reactor with many SSCs important to safety will be more extensive than for a reactor manager of a subcritical assembly.
211	NUSSC	Germany	106	7	15			The training programme should cover theoretical and facility-specific knowledge <u>DS509E</u> [6].	Please use a consistent format for references.	X			
212	NUSSC	Germany	107	7	19			The safety limits are established in the design stage as a result of safety analysis. ~~A graded approach cannot be used in the application of the requirements on establishing safety limits to protect the integrity of the physical barriers against release of radioactive material. For example, the value of the safety limit on the maximum cladding temperature would be the same regardless of the potential hazard of the facility.~~ However, the depth of analysis that is used to establish the safety limit should vary depending on the potential hazard of the facility.	Please reformulate. The example with cladding temperature may be mis-leading. Indeed, the maximum cladding tem-perature does not de-pend on the potential hazard, but it varies de-pending on the cladding material. The statement: "the depth of analysis that is used to establish the safety limit should vary depending on the potential hazard of the facility." is crucial and should be kept. See also the general comment.		X The sentence now reads, "For example, the value of the safety limit on the maximum cladding temperature should be based on the physical properties of the cladding material and its environment, regardless of the potential hazard of the facility."		
213	NUSSC	Germany	108	7	26			The requirement for action after a violation of operational limits and conditions, cannot be <u>graded</u> ~~applied using a graded approach~~. The nature of the action will be determined by the regulatory framework of the State and will typically depend on the severity of the violation.	To stronger emphasize that certain requirements cannot be graded.			X	The terminology in this safety guide has been revised throughout to use consistent language, "The use of a graded approach in the application of the safety requirements" The phrases "can be graded" and "cannot be graded" have been removed from the safety guide

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214		Republic of Korea	7	7	28			Para 7.44 of SSR-3 [1] states: "All routine and non-routine operational activities shall be assessed for potential risks associated with harmful effects of ionizing radiation. The level of assessment and control shall depend on the safety significance of the task." For a research reactor …	Separate paragraph is used when unabridged requirement of SSR-3 is quoted for maintaining consistency through this Safety Guide.	X			
215		Belgium	8	7	29			Requirements for the commissioning programme are established in Requirement 73 of SSR-3 [1]. Recommendations on meeting Requirement ~~37~~ 73 are provided in DS509A [2]. Typographical correction	Typographical correction	X			
216	NUSSC	Japan	39	7	32			Stage C (power ascension tests and power tests up to rated full power, as defined in ~~Section 5~~ para 3.17 and paras 5.30-5.37 of DS509A [2]) of commissioning is not required for subcritical assemblies, and its scope, extent, and duration is much less for low power research reactors (typically of low potential hazard) compared to those of higher power levels. The scope, number …	User-friendliness. Three elements are referred from draft DS509A.	X			
217	NUSSC	Japan	40	7	36			The list of operating procedures presented in Appendix II of DS509D [5] should be assessed for applicability to a specific research reactor. The number of operating procedures developed should be dependent upon the characteristics of the research reactor and should be less for simpler reactors with low potential hazard.	Please clarify definition of "simpler reactors with low potential hazard." In this draft, "simpler reactors with low potential hazard" is first appearance here.		X Text now reads, "The number of operating procedures developed should be dependent upon the characteristics of the research reactor and should be less for ~~simpler~~ reactors with fewer SSCs important to safety and a low potential hazard."		
218	NUSSC	Japan	41	7	43			A maintenance, periodic testing and inspection programme is required for all research reactors regardless of their potential hazards. The scope, extent of the programme, and the resources required for planning, implementation and assessing this programme should be commensurate with the potential hazards of the facility and could vary significantly depending on the design, size and complexity of the reactor. While for a simple and low potential hazard facility, these activities can be performed by the operating personnel, a dedicated group is needed for a large research reactor facility with a high potential hazard. The number of maintenance staff should also be commensurate with the potential hazards of the facility.	Please clarify definition of "a simple and low potential hazard facility." It is first appearance here.		X Text now reads, "For a facility with a low potential hazard and fewer SSCs important to safety, these activities can be performed by the operating personnel, but a dedicated maintenance group is typically needed for a large research reactor facility with more SSCs and a high potential hazard."		
219	NUSSC	Germany	109	7	48			~~A balance should be sought between the improvement in detection of faults owing to more frequent testing, the risk that testing could be performed incorrectly and leave the SSC in a degraded state, the degradation of SSCs as a result of the testing activity, and the reduced availability of the SSC while testing is performed. The testing frequency could be increased to the point where testing causes more frequent failures of SSCs, and so it should be recognized that there is always an optimum test frequency. This consideration also applies for periodic maintenance. The frequency of replacement of SSCs subject to ageing degradation due to, for example, existence of high radiation fields, can be based on the feedback of operating experience, including that from other reactors, and on the bases of the results of research and development.~~	This paragraph does not deal with the graded approach but describes optimisation of testing. As this is out of the scope of DS511 we propose to delete this para.		X Para 7.44 introduces three aspects of Requirement 77 that can be applied using a graded approach. 7.44 has been clarified to read, "Three aspects of Requirement 77 should be applied using a graded approach: the development of procedures, the frequency of maintenance, periodic testing and inspection, and the work permit system used to implement these procedures. The graded approach should be based on the potential hazard of the facility, safety significance of the SSCs involved, complexity of the maintenance, periodic testing and inspection activity, and the potential radiation risk of relevant tasks."		Para 7.44 introduces three aspects of Requirement 77 that can be applied using a graded approach. The development of **procedures**, the **frequency** of maintenance, periodic testing and inspection, and the **work permit system** Paras 7.45-46 address procedures Paras 7.47-49 address frequency of maintenance Para 7.50 addresses work permits

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220	NUSSC	Germany	110	7	49			~~The period for which an SSC is permitted to be out of service while reactor operation continues is usually stated in the operational limits and conditions for the facility and can be based on the availability requirement for the SSC from the safety analysis. For example, outage times of any duration might not be acceptable for automatic shutdown systems, while outage times of up to several days might be acceptable for other systems, with appropriate compensatory measures (e.g. for a purification system monitoring the primary coolant pH, the system could be unavailable for several days, but pH measurements could be taken manually each shift). The allowed outage time should depend on the extent to which safety is impacted, or the ease of applying compensatory measures.~~	This paragraph does not deal with the graded approach but describes dealing with outages. As this is out of the scope of DS511 we propose to delete this para.		X Para 7.44 introduces three aspects of Requirement 77 that can be applied using a graded approach. 7.44 has been clarified to read, "Three aspects of Requirement 77 should be applied using a graded approach: the development of procedures, the frequency of maintenance, periodic testing and inspection, and the work permit system used to implement these procedures. The graded approach should be based on the potential hazard of the facility, safety significance of the SSCs involved, complexity of the maintenance, periodic testing and inspection activity, and the potential radiation risk of relevant tasks."		Para 7.44 introduces three aspects of Requirement 77 that can be applied using a graded approach. The development of **procedures**, the **frequency** of maintenance, periodic testing and inspection, and the **work permit system** Paras 7.45-46 address procedures Paras 7.47-49 address frequency of maintenance Para 7.50 addresses work permits
221	NUSSC	Germany	111	7	51			~~Such activities are often performed by contracted, external experts~~	doubling	X			
222	WASSC	Germany	134	7	51			Such activities are often performed by contracted experts external to research reactor operating organizations. ~~Such activities are often performed by contracted, external experts.~~	Surplus sentence.	X			
223	NUSSC	Germany	112	7	54			Research reactors with a low potential hazard, ~~having power ratings up to several tens of kilowatts,~~ requiring infrequent changes to core configuration, may need a less comprehensive core management and fuel handling programme. ~~These reactors require infrequent core adjustments to compensate for burnup~~. They operate with substantial margins to thermal limits, allowing the consideration of a broad envelope of acceptable fuel loading patterns in the initial safety analysis in lieu of core specific calculations. While all recommendations in DS509C [4] should be considered, some might not apply to these ~~low power level~~ low potential hazard reactors. Some research reactors~~, including critical and subcritical assemblies,~~ may undergo frequent changes to core configuration and fuel handling operations. As a result, these facilities require a more comprehensive core management and fuel handling programme.	Hazard potential is inde-pendent of power, mis-leading. Doubling missleading		X Text now reads, "Research reactors with a low potential hazard, ~~having power ratings up to several tens of kilowatts,~~ requiring infrequent changes to core configuration, may need a less comprehensive core management and fuel handling programme. These reactors ~~require infrequent core adjustments to compensate for burnup. They~~ operate with substantial margins to thermal limits, allowing the consideration of a broad envelope of acceptable fuel loading patterns in the initial safety analysis in lieu of core specific calculations. While all recommendations in DS509C [4] should be considered, some might not apply to these ~~low power level~~ research reactors with a low potential hazard. Some research reactors, including some critical and subcritical assemblies, may undergo frequent changes to core configuration and fuel handling operations. As a result, these facilities require a more comprehensive core management and fuel handling programme.		Comments were broadly incorporated into the text, but a reference to citical assemblies was retained but as an example.
224	NUSSC	Japan	42	7	58			The potential fire hazards should be discussed in the safety analysis report and an indication should be provided of their relative importance (i.e. in terms of likelihood and consequences) in the facility. This information can serve as a basis for the use of a graded approach in the implementation of the fire ~~prevention and~~ protection measures. For example, ….	Duplication. Also, the term “fire prevention” is not used in SSR-3.	X			
225	NUSSC	Germany	113	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~~ [33].	style			X	The IAEA has adopted a standard format for references which treats safety standards differently to other referenced documents. For safety standards, the first time it is referenced the full title and number are stated, then subsequent references use just the number

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226	NUSSC	Germany	114	7	77			Para 7.110 of SSR-3 [1] lists measures which are required in radiation protection programs for research reactors of all levels of potential hazard and hence cannot be subject to a graded approach.	clarification		X Text now reads, "...for research reactors of all levels of potential hazard and hence cannot be applied using a graded approach."		
227	NUSSC	Germany	115	7	78			The application of the requirements for the radiation protection programme should be consistent with the reactor's design and its utilization (see paras 1.5 and 1.9 of DS509F [7]). The scope of the environmental monitoring programme is dependent on the radiological hazard potential ~~location~~ of the reactor. ~~For example, a facility located close to a densely populated area should result in a more extensive environmental monitoring programme~~.	The necessary environmental monitoring programme does not dependent on population density in its vicinity. Even for a low-density populated area it has to be ensured that dose limits for the public will not be exceeded taking all exposure pathways into account.		X Text now reads, "The scope of the environmental monitoring programme is dependent on the potential radiological hazard of the reactor."		
228	NUSSC	Germany	116	7	80			For a ~~low power~~ research reactor with a low hazard potential, with no loca-tions where high dose rates are present, level II and level III controlled areas may not be needed.	Low power does not automatic means low hazard potential.	X			
229	NUSSC	Japan	43	7	87			The appropriate frequency of inspections, and the measures for mitigation of ageing effects, could be based on the importance to safety, estimated service life, complexity and ease of replacement of individual SSCs. In most research reactors, it is feasible to inspect most SSCs periodically and to replace components if necessary. For a research reactor with a high potential hazard, inspections should be prioritized where degradation mechanisms have been identified. In the same facility, items not important to safety could be ~~excluded from an inspection programme or~~ inspected at a low frequency. For a research reactor with a low potential hazard, the SSCs that perform the main safety functions should be prioritised for ageing management inspections.	A research reactor with a high potential hazard are required to be subject to all of the requirements stated in SSR-3		X The sentence has been deleted "~~In the same facility, items not important to safety could be excluded from an inspection programme or inspected at a low frequency.~~"		Items not important to safety do not need to be discussed here.
230		Belgium	9	7	91			…that apply during ~~normal~~ the normal operating regime…	Typographical correction	X			
231		Belgium	10	8	2			…type and number ~~and~~ of procedures to be prepared	Typographical correction	X			
232	NUSSC	Germany	117	8	3			~~The requirement for the operating organization to retain personnel and preserve knowledge of the research reactor (see para 8.7 of SSR-3 [1]) should be applied using a graded approach, based on the potential hazards of the facility as well as based on the knowledge of the facility and its safety significance to decommissioning.~~	I see this very critical. Facilities with a low hazard potential often have fewer experienced personnel hence the departure of only one person might leave a big gap whereas in larger operation organization this can be easier be compensated		X Sentence added, "For research reactors with a smaller operating organization, preserving the knowledge of a small number of key personnel may be essential for preparation for decommissioning."		The comment about small operating organizations is a good additional criterion for the application of a graded approach.
233	NUSSC	Japan	44	8	3			Preparation for decommissioning should include consideration of knowledge of the facility which might be lost when the reactor is permanently shut down because of possible retirement or departure of experienced personnel. ~~The requirement for the operating organization to retain personnel and preserve knowledge of the research reactor (see para 8.7 of SSR-3 [1]) should be applied using a graded approach, based on the potential hazards of the facility as well as based on the knowledge of the facility and its safety significance to decommissioning.~~	Knowledge of any research reactor must be preserved in operating organization with fully meeting the requirements described in SSR-3, until release from regulatory control.			X	When developing the plan for preserving knowledge of the facility, a graded approach is appropriate to ensure that knowledge of all hazards is fully captured
234	NUSSC	Germany	118	8	4			The scope and level of details of decommissioning plan should be subjected to use of a graded approach based on the potential hazard of shutdown facility, in particular when all nuclear fuel is removed from the site significantly reducing the hazard potential of the research reactor, resources available for decommissioning, time period to decommissioning and the required end state of the facility (e.g. full or partial decontamination and/or dismantling or release of the site from regulatory control).	Would it not make sense to mention here the significantly reduced hazard potential as soon as the fuel is removed from the facility and hence a graded approach to the new "state"?		X Text now reads, "The scope and level of details of the decommissioning plan should use a graded approach based on the potential hazard of the shut down facility (e.g . with nuclear fuel removed),..."		editorial
235	NUSSC	Japan	45	9	2			The requirement that safety and security issues are addressed in an integrated manner, cannot be applied using a graded approach. Safety and security are two distinct areas essential for reactor operation. A graded approach should be used in the application of safety requirements and in the application of security recommendations.	Please clarify the first sentence and the third sentence in this paragraph. These sentences are seemed to be inconsistent.			X	Similar to the discussion in para 6.12, the requirement is for **integration**, so a graded approach cannot be used, either there is integration or not. The third sentence is highlighting that safety requirements can use a graded approach (as discussed throughout this Safety Guide) and security recommendations in a similar manner.

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236	EPReSC	Australia	2	9				I'd like to propose that consideration is given to expanding the text of Chapter 9. It is important that the interface between Safety and Security is considered, however the information is sparse. Since this document is currently at Step 7 it may be beneficial for the topic to be discussed at the Standards Committee meetings to engage further experts to enhance this chapter.	The Safety and Security interface has been identified by EPReSC as an important area that is lacking in Safety Standards. This chapter presents an opportunity to consider this area for research reactors.		X Para 9.3 updated to read, "Recommendations related to the interfaces between safety and security are included in the Safety Guides referenced in para 1.3, in particular DS509E [6] and DS510B [11]." Plus a footnote, "Additional guidance on the use of a graded approach and the safety and security interface is available in IAEA-TECDOC-1801, Management of the Interface between Nuclear Safety and Security for Research Reactors (2016)."		Guidance on managing the interface between nuclear safety and security has been included where appropriate in revised versions of all 10 Safety Gudies for research reactors (DS509 and DS510). This Section is intended to provide guidance focussed on the use of a graded approach in the application of requirement 90 on safety-security interface.
237		Republic of Korea	1	General					The quotation format for the requirements of SSR-3 is needed to be unified for maintaining consistency through this Safety Guide. Some requirements are quoted directly by stipulating their original sentences as they are, but others are quoted indirectly by stipulating their numbers only.			X	Including a quote for every requirement makes the document unnecessarily long. The requirement is only quoted in full when it is needed to help to understand the guidance provided.
238	NUSSC	USA	36	References		page 80		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).	In order to recognize all the sponsors and provide consistency with other safety guides, recommend revising the reference	X			
239	NUSSC	Germany	1			General		DS511 includes a separate paragraph for each requirement of SSR-3. It is clearly written that SSG-22 should be considered as guide to SSR-3. Is it really necessary to mention each and every requirement again and yet in an inconsistent form? Sometime quotes are given sometimes they are omitted. Often the corresponding paragraphs add no value to the draft. Each requirement of sections 6 and 7 is listed in a separate para-graph (see above). Would it not be clearer, as done in some cas-es, to have a clear structure: 1. Cite the requirement. 2. Clearly indicate the list of requirements that cannot be graded. At the moment is sometimes it is not clear if the given require-ments are the only ones that are not gradebale e.g. 6.143 "Some elements of this requirement cannot be applied using a graded approach" 3. List/give examples of requirements that can be applied using a graded approach			X Revisions have been made through the specific comments received to improve the guidance regarding where a graded approach cannot be applied. The structure suggested is the format that was used in developing the draft. 6.143 has been revised to clarify, "...~~Some~~ Two elements of this requirement cannot be applied using a graded approach: the requirement to prevent criticality by an adequate margin (para 6.198 (a) of SSR-3 [1]) or to enable individual fuel elements and assemblies to be identified and tracked (para 6.198 (i) of SSR-3 [1]). The application of other elements of the requirements can use a graded approach, based on the potential hazard of the facility, the design of the reactor and its utilization programme. "		When every requirement from SSR-3 is quoted in full it lengthens the document unnecessarily. The current revision quotes the requirement only where it is needed to understand the associated guidance.
240	NUSSC	Germany	2			General		In a recent Webinar on "Application of Graded approach in regulating nuclear facilities" and a new TECDOC on this topic to be published soon a three-step process is proposed. We recommend harmonizing recommendations of IAEA on this topic and to publish consistent recommendation on how to apply a graded approach.		X			The authors of the TECDOC wre involved in the early review of DS511. The current draft is consistent with the TECDOC being developed. The safety guide has a 2 steps in applying a graded approach. The TECDOC does the same but adds an initial step to " Identify the decision associated with the regulatory function"

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241	NUSSC	Germany	3			General		Please use uniform format for giving references: Ref.[x] or [x]			X The safety guide uses the prescribed IAEA format for references.		The IAEA has adopted a standard format for references which treats safety standards differently to other referenced documents. For safety standards, the first time it is referenced the full title and number are stated, then subsequent references use just the number. For documents other than safety standards the reference uses Ref. [x].
242	NUSSC	Germany	4			General		Many of Paras are formulated as usual information (wording as “could be”, “may be” “is/are”, etc. is used). Indeed all Paras contain a valuable information, but these are not recommenda-tions in a meaning of the IAEA (“should” formulation). Please try to reformulate the Paras using conventional wording of the IAEA. Furthermore, many Paras contain solely a citation of Require-ments from other IAEA Safety Documents. These can also not be understood as recommendations. In these Paras further com-ments on application of the cited Requirement is necessary. A combination with another Para. may be a practicable solution. The few specific comments on this topics that are included be-low are only examples, how the Paras. could be modified. Please review the entire document for the wording.		X			Throughout the document the use of "should" has been improved, replacing less precise language
243	NUSSC	Germany	5			General		This safety guide does not provide a useful and practicable guidance on the use of the graded approach. In particular, the guidance in sections 3 to 8 lacks from a more differential discussion how a requirement can be graded based on the three categories defined in para 2.8.					Most of the guidance discusses the application of the requirements for the different categories of facilities defined in 2.8. Responses to comments from reviewers also resulted in improvement in this regard
244	NUSSC	Germany	6			General		Grading of requirements, in particular for design, may require a refined categorization. At least, needs for cooling of the fuel as a second category helps to apply a graded approach to some requirements, where the risk categories are not appropriate.					see paras 6.109 - 6.112 which discuss the graded approach based on the physical nature of the reactor design, not just on the hazard level of the facility
245	NUSSC	Germany	7			General		Paras. 3.14 and 3.15 are not necessary as with SSG-24 (and later DS510A) provides sufficient guidance on this topic. It should be considered to delete paras 3.14 and 3.15			X The paras have been revised instead of deleted. They address Requirement 1 from SSR-3 and discuss the use of bounding analyses where a large safty margin in the design permits. The text references DS 510A.		
246	NUSSC	Germany	8			General		Section “THE USE OF A GRADED APPROACH IN INSPECTION AND ENFORCEMENT” does not provided any specific recommendations for applying the graded approach with respect to research reactors. It is written in a very general manner and is already completely covered by GSG-13 paras 3.210 ff. (for inspections) and 3.295 ff. (for enforcement). It should be considered to delete this section.					The paras have been improved with comments received. The guidance is consistent with GSG-13 which is now referenced prominently at the beginning of section 3. For user benefits it is preferred to keep the guidance.
247	NUSSC	Germany	9			General		Use of a graded approach in site evaluation is already addressed in SSG-9. Factors to be considered in site evaluation are not specific for siting and should be included in the description of Step 1 of the graded approach. This section does not provide any research reactor specific new information or guidance.					SSG-9 addresses only seismic hazards in site evaluation. Section 5 has been expanded to include human-induced events. Guidance is provided for screening of research reactors in the siting process, and refers the reader to the graded approach described in each of the relevant siting safety guides

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248	NUSSC	Germany	10			General		Delete and omit expressions like "such as some sub- and critical assemblies"	The term low hazard potential is more com-prehensive and does not stipulate the idea that critical and subcritical assemblies are per se of a low hazard potential (which they are not)			X	One objective of the revision to SSR-3 and this safety guide was to include subcritical assemblies within the definition of research reactors.The phrase "such as some" makes it clear that not all critical and subcritical assemblies are a low potential hazard.
249	NUSSC	Japan	1			General		Some paragraphs describe the whole texts of OARs in SSR-3, meanwhile some other paragraphs do not describe. It is suggested to describe whole texts of OARs in SSR-3 in every relevant paragraph, with making this safety guide to be one-stop document.				X	When every requirement is repeated in full, the Safety Guide becomes much larger. An attempt has been made to balance the length of the document with providing sufficient specific detail where it is needed.
250	NUSSC	Netherlands	1			General		This guide is a very welcome improvement! It gives clear guidance on how to approach grading.		X			Thank you.
Total									**TOTAL Comments**	**89**	**96**	**60**	**117**