DS524: Draft Safety Guide on "Radiation Protection Aspects of Design for NPPs"
Resolutions to the comments provided by the Review Committees (first review)

Comments provided: *1 GERMANY-NUSSC (GER-NUS); 2 SOUTH AFRICA (S. AFRI); 3 FRANCE; 4 FINLAND; 5 USA-1; 6 GERMANY-EPReSC (GER-EPR); 7 BELGIUM; 8 GERMANY-RASSC (GER-RAS); 9 ENISS; 10 JAPAN-RASSC; 11 JAPAN-EPReSC; 12 JAPAN-NUSSC; 13 JAPAN-WASSC; 14 UKRAINE; 15 SWEDEN; 16 UK-ONR; 17 IRAN; 18 USA2-NSGC*

Additional comments (after deadline): *19 EGYPT; 20 USA-3*

25 October 2021

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
General comments							
1 GER-RAS 1 (2) * **: See the Note at the bottom of the table*	Table of contents	Agree on a uniform hierarchical structure (see table of content para 5 "plant layout" and table of content para 7 "plant layout")		Accepted			*Final format of 'CONTENTS' will be fixed during the Technical Editorial review.*
2 GER-NUS 1 (1)	General	Radiological acceptance criteria are discussed in SSG-2 Rev. 1 and should be stronger reflected and considered in DS524 by establishing adequate links between both safety guides.			*The following changes will be incorporated:* *1. Para. 3.52 will be modified:* *Line 9*: "… for demonstrating compliance with the radiation ~~dose limits~~ acceptance criteria should be		See also comment 106 (JAPAN-EPReSC 2) to para. 3.52.

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					based on conservative assumptions for the analysis of …" *2. Two new paras will be added (2.29A for operational states and 2.30A for accident conditions):* 2.29A. The design of the NPP should be such as to ensure that during operational states the corresponding dose limits and dose constraint for site personnel and for public will not be exceeded. It should be demonstrated that the radiological acceptance criteria for operational states, identified in accordance with the dose limits and dose constraints and reflected in the design limits, are met in the design. Further recommendations on radiological acceptance criteria are provided in SSG-2 (Rev. 1) [29] (see para 4.8 about normal operation and paras 4.9 and 7.23 about anticipated operational occurrences).		Added paragraphs link acceptance criteria, dose limits, reference levels and design limits in accordance with SSG-2 (Rev. 1) for both operational states and accident conditions.

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					2.30A. The design of the NPP should be such as to ensure that the dose limits for site personnel and the reference levels for public will not be exceeded during accident conditions. It should be demonstrated that the corresponding radiological acceptance criteria, identified in accordance with the dose limits and reference levels and reflected in the design limits, are met in the design. Further recommendations on radiological acceptance criteria for accident conditions are provided in SSG-2 (Rev. 1) [29] (e. g. in paras 4.10, 4.11, 7.31, 7.46, 7.58, and 7.60).		
3 ONR UK 18	General comment	Link to SSG-2 Rev 1 radiological acceptance criteria aspects at the appropriate places.	Radiological acceptance criteria are discussed within DS524. Linking to SSG-2 Rev 1 could provide further clarity on this aspect.	Accepted			See above resolution to general comment 2 (GER-NUS 1).
4 ENISS 0	General comment	This is a very comprehensive draft report with the purpose to clarify all aspects of RP for new design of nuclear power reactors. As such it seems indispensable in order to meet the future RP requirements.					

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		Nevertheless, there is no glossary or definitions stated in the document but reference to other IAEA documents as e.g. IAEA BSS. In some cases, more explanations to the stated recommendations would have been preferable. Especially the repeated use of "dose constraints at workplaces" without clear definition of the concept may cause confusion … *and that the relevant dose constraints will be taken into consideration*. (page 10)". What is relevant or should the optimization start below the dose constraint or above, as both recommendations are provided in the document. Noteworthy, ICRP has recently announced that this is an area that will be lifted in coming RP recommendations as further explanations are needed of these dose concepts in optimization. The environments is repeated in line with the public in the document at various places but on page 62 it is acknowledged that humans are part of the environment – a welcome statement but is the officially endorsed by the IAEA?			*See above resolution to general comment 2 (GER- NUS 1) Two new paras will be added (2.29A for operational states and 2.30A for accident conditions).*		Use of 'constraints' and 'reference levels' is covered in detail in GSR Part 3 and this is reflected in several paras of Section 2 of DS524. . The use of the terms 'human' and 'environment' in page 62 seems not causing confusion.
5 FINLAND 1	General	IAEA should check the use of term radioactive material in this safety guide and line it with the glossary. For radioactive releases a term radioactive substance is used. The radioactive material is material that is under regulatory control according to the glossary.			*No necessary changes were identified*		Consistency on the use of these terms with the Safety Glossary has been verified and it will be further checked and fixed during Technical Editorial review. See the use of 'radioactive substances' in SSR-2/1 (Rev.1), e. g. in paras 2.7; 6.48; 6.63; 6.71; 6.79; 6.84.
5bis GER-RAS 2 (3)	General	e. g. ~~Cs-137~~ ^{137}Cs (see 4.17. fourth line) or ~~59Co~~ ^{59}Co (see I-141. last bullet)		Accepted			Corrected. Final verification of format will be done during Technical Editorial review.

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SECTION 1							
6 IRAN 1	Paragraph 1.1/Last line	"…to protect site personnel, and the public ~~and the environment~~ against…"	The definition of the term 'Radiation protection' according to the IAEA Safety Glossary is: "1. (against radiation) **radiation protection** (also **radiological protection**). The protection of people from harmful effects of exposure to ionizing radiation, and the means for achieving this. The accepted understanding of the term *radiation protection* is restricted to *protection* of people. Suggestions to extend the definition to include the *protection* of non-human species or the *protection of the environment* are controversial." The topic of this standard is			Rejected	Current formulation was agreed during the process of review/approval of the DPP by the SSCs and CSS.

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			"**Radiation Protection Aspects of Design for Nuclear Power Plants"** so the protection of the environment is not included. If there are some aspects for protection of environment, it is suggested to make it clear as a footnote.				
7 GER-RAS 3 (3)	1.3. third bullet	GSR Part 2 ~~(Rev. 1)~~ [5], Leadership and Management for Safety;	Editorial	Accepted			
8 IRAN 2	Paragraph 1.3/ Third bullet	"GSR Part 2 ~~(Rev.1)~~ [5], Leadership and Management for Safety;	No revision	Accepted			
9 IRAN 3	Paragraph 1.7/ Second line	"…by operating organizations and contractors ~~organizations,~~…"	Please look through Paragraph 3.1/Line 5 of SSR-2/2 (Rev.1), also paragraph 5.11 of this draft.	Accepted			
10 JAPAN (NUSSC) 1	1.11. 3.5. 3.20. 3.27. 5.15. 5.93.	operational experience -> operating experience	In SSR-2/1 (Rev. 1), "operating experience" is only used. Modify "operational" to "operating" for consistency within	Accepted			Corrected in all paras.

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	7.17.		this Guide. The title of subsection (para. 3.5-3.11) is "Human resources and operational experience", but the paragraph in this subsection use "operating experience".				
11 GER-EPR 1	1.14	…while Section 4 deals with the control of sources of radiation and estimation of radiation dose rates in all plant states ~~and in~~ including decommissioning	It might seem that decommissioning is not a state of a NPP.			Rejected	In accordance with the Safety Standards decommissioning is not a plant state. The terms 'plant states' are indicated in SSR-2/1 (Rev. 1), e. g. see definitions in page 65, and in the Safety Glossary.
SECTION 2							
12 GER-EPR 2	2.1	In para. 2.2 ~~from~~ of SF-1 [1] it is stated:	Editorial See also 2.3, 2.4	Accepted	*The para. 2.1 will be modified as follows:* "… be assessed and controlled. In para. 2.2 of ~~from~~ SF-1 [14] it is stated: …"		
13 GER-RAS 4 (3)	2.1. second line	In para. 2.2 from SF-1 ~~[1]~~ [14] it is stated:…	Wrong Reference	Accepted			See resolution to comment 12 (GER-EPR 2) about this para.

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
14 IRAN 4	Paragraph 2.2/ Second line	"…design to comply with para. 2.6 of ~~the~~ SSR-2/1 (Rev. 1) [1]:"		Accepted			See resolution to comment 12 (GER-EPR 2) about this para.
15 S. AFRI 1	2.2	"2.2. In accordance with the principles of radiation protection, provisions are required to be made in the design to comply with the Radiation Protection Objective as given in para 2.6 of SSR-2/1 (Rev. 1) [1]:	The original text from NS-G-1.13 (para 2.1) is clearer.			Rejected	The RP Objective is not mentioned in para. 2.6 of SSR-2/1 (Rev. 1) and DS524 provides recommendations to meet safety requirements, not to SF-1. See resolution to comment 14 (IRAN-4) about this para.
16 S. AFRI 2	2.3	"2.3. In Requirement 5 from SSR-2/1 (Rev. 1) [1], ~~Safety of Nuclear Power Plants: Design~~, it is stated:"	Editorial, Suggest that the title be removed for consistency with the rest of the document.	Accepted			
17 S. AFRI 3	2.4	"2.4. In Requirement 81 ~~"Design for radiation protection"~~ from SSR-2/1 (Rev. 1) [1] ~~Safety of Nuclear Power Plants: Design,~~ it is stated:	Editorial Suggest that the title be removed for consistency with the rest of the document.	Accepted			See comment to para 2.3
18 S. AFRI 4	2.5	To achieve the highest level of safety that can reasonably be achieved in the design of a nuclear power plant, measures <u>are</u> required to be taken to do the following, consistent with national acceptance criteria and safety objectives	Editorial, and to order to be consistent with the corresponding text in Para 2.8 of SSR-2/1 (Rev 1)	Accepted	*An additional correction will be incorporated:* "2.5. To achieve the highest level of safety … nuclear power plant, measures are required to be taken to do the following, consistent with national … "		

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19 S. AFRI 5	2.10	"2.10. Para. 4.6. of SSR-1 [4] provides requirements for the assessment of the site suitability, including assessment ~~that~~ on how characteristics of the site and its environment could influence the transfer of radioactive material released from the nuclear installation to people and to the environment."	Editorial/Gramma	Accepted	*Para. 2.10 will be modified as follows:* "2.10. Para. 4.6. of SSR-1 [4] provides requirements for the assessment of the site suitability including an assessment ~~that~~ on how characteristics of the site and its environment could …"		See the other comments about this para.
20 GER-EPR 3	2.10	"2.10. Para. 4.6. of SSR-1 [4] provides requirements for the assessment of the site suitability including assessment ~~that~~ how characteristics of the site and its environment could	editorial	Accepted			See resolution to comment 19 (S. AFRI 5) about this para.
21 USA-2 10	Para 2.10, line 2	Add "an" before "assessment." Add "demonstrates" or another intended word before "how"	Editorial	Accepted			See resolution to comment 19 (S AFRI 5) about this para.
22 USA-2 11	Para 2.11, line 5	Change "request" to "states"	Editorial	Accepted	*Second part of para. 2.11 will be modified as follows:* "Furthermore para. 3.29. of GSR Part 3 [2] states ~~request~~ that:		
23 GER-RAS 5 (3)	2.12. last line	… in accordance with GSR Part 4 (Rev. 1) [6], Requirement 9, 'Assessment of the provisions for radiation protection'. ~~Of GSR Part 4 (rev. 1) [6])~~	Editorial	Accepted			

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24 GER-RAS 2 (2)	2.13	"2.13. ~~(New)~~ Safety assessment on radiation protection should be performed at different stages or phases, including site evaluation, design, manufacturing, construction, assembly of SSC, commissioning, operation, maintenance, and decommissioning (or closure) of NPPs. Such assessment should be performed in accordance with the requirements from paras 3.31 – 3.36 of GSR Part 3 [2]."	The word '*New*' in brackets isn't necessary. An assessment has to be carried out in each phase of the life cycle and in addition periodically (PSR).	Accepted	*"(New)" was a typo. (It indicated that it was a new para; then should have been deleted).* *Second part of the 'Reason': No changes seem necessary; already covered in 2.15.*		
25 GER-NUS 6 (3)	2.13. line 2	…, construction, assembly of structures, systems and components (SSC), commissioning, operation, …	Please write out the abbreviation.	Accepted			
26 GER-NUS 3 (1)	New paragraph after 2.13	It should be demonstrated that limits for releases specified in licensing conditions or in regulations will not be exceed in operational states and that dose limits for exposed workers will not be exceeded in normal operation or while managing anticipated operational occurrences.	NO and AOO (the two operational plant states) are not addressed while para. 2.16 addresses DBA and 2.17 addressees DEC. Both are necessary: releases shall not exceed established limits and dose limits for shall not exceed dose limits for exposed workers. This is also expressed in SSG-2 Rev.1		*A new para 2.15A will be added:* "2.15A. It should be demonstrated that limits for releases and dose limits for exposed workers specified in regulations or licensing conditions, will not be exceeded in operational states."		The modification of the suggested wording is provided to simplify the text without changing the meaning.
27	2.16 Line 8	"… In accordance with these requirements, it should be demonstrated that key plant	In addition to off-site consequences		*Last part of para 2.16 will be modified as follows:*		It seems more adequate to recommend that dose limits

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GER-NUS 4 (1)		parameters do not exceed the specified design limits and that all design basis accidents have no or only minor radiological impacts, on or off the site, and do not necessitate any off-site intervention measures (e.g. evacuation). It should be demonstrated that dose limits for workers will not be exceeded when controlling and mitigating design basis accidents. Some member states apply higher dose limits for accident conditions with lower frequencies."	resulting in doses to the public, doses to the workers need to be considered, too. For DBA the dose limits for radiation exposed workers shall not be exceeded. According to Requirement 19 and para. 5.25 of SSR 2/1 DBA shall be managed without on-site and off-site radiological consequences. In addition, consistency with SSG-2 Rev.1 need to be achieved.		"… In accordance with these requirements, it should be demonstrated in a conservative manner that key plant parameters do not exceed the specified design limits and that all design basis accidents have no or only minor radiological impacts, on or off the site, and do not necessitate any off-site ~~intervention measures~~ protective action (e.g. evacuation). Dose limits[1] for workers (including those who are controlling and mitigating DBAs) should be considered in the design criteria. Further recommendations are provided in para. 6.14. *Footnote 1)* Some MSs apply higher off-site doses as acceptance criteria for the DBAs having lower frequencies.		for workers (including those who are controlling and mitigating DBAs) should be considered in the design criteria. This also covers the demonstration as well. For the second sentence suggested, it seems better to place it in a footnote. See also the comment 28 (UKRAINE-1) about this para.
28 UKRAINE 1	2.16/10	"…*intervention measures* (e.g. evacuation)" ... protective actions (e.g. evacuation)	IAEA Safety Glossary: 2007 Edition (2007), GSR Part 7	Accepted	See resolution to comment 27 (GER-NUSSC 4) about this para.		

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29 GER-EPR 4	2.17	In accordance with Requirement 20 of SSR-2/1 (Rev. 1) [1] the design extension condition (DEC) may be analysed using best estimate assumptions. It should be demonstrated that the identified reasonably practicable provisions prevent severe fuel damage (DEC A) and mitigate severe accidents (DEC B).	Please add the abbreviation for comprehensibility.	Accepted			
30 USA (to NSGC) 1	Pages. 14-16, Interfaces between safety and security	It is recommended that this paragraph be expanded to include references to other IAEA Nuclear Security Series (NSS) publications that are also applicable to nuclear power reactors. Recommended references to include are: NSS Implementing Guide 19 "Establishing the Nuclear Security Infrastructure for a Nuclear Power Programme;" Implementing Guide No. 25-G: "Use of Nuclear Material Accounting and Control for Nuclear Security Purposes at Facilities;" Implementing Guides No. 10-G (Rev 1) "National Nuclear Security Threat Assessment, Design Basis Threats and Representative Threat Statements"			*The following two paras will be added:* 3.32A. During the development of the design basis for radiation protection the nuclear security threats requirements should be taken into consideration in accordance with guidance from the Implementing Guide No. 10-G (Rev 1) "National Nuclear Security Threat Assessment, Design Basis Threats and Representative Threat Statements". 3.32B. For the identification of the design basis of the radiation protection measures for storage and transport of radioactive materials, applicable security guidance should be taken into consideration in accordance with NSS		It seems more appropriate to include these paras in Section 3, after para. 3.32.

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					Implementing Guide 19 "Establishing the Nuclear Security Infrastructure for a Nuclear Power Programme;" [xx] and with Implementing Guide No. 25-G: "Use of Nuclear Material Accounting and Control for Nuclear Security Purposes at Facilities;" [xx].		
31 USA (to NSGC) 2	Page 14, 2.19A	Reference in paragraph 2.19A should be made to the newer 2018 INFCIRC/225/Rev.5) reference [34] rather than the older 2011 reference [19A]. See complete reference in paragraph 3.32			"2.1A. IAEA Nuclear Security Series No. 13 (INFCIRC/225/Rev.5) [19A] and No. 27-G (INFCIRC/225/Rev.5) [34] provide recommendations for the physical protection of nuclear material and nuclear facilities. Specifically, ~~its~~ in paras 3.28 and 5.13 of [19A] it is stated ~~state~~: …"		It seems convenient to keep both publications. Both are available on IAEA website and '27-G (INFCIRC/225/Rev.5) [34]' has not superseded '13 (INFCIRC/225/Rev.5) [19A]'. Para. 4.7 of Ref. [34] refers to the para 3.28 of Ref [19A]; para. 5.13 of Ref [19A] was not included and referred in the Ref. [34].
32 IRAN 5	Paragraph 2.20/ First line	"…for all persons on the site in a nuclear or radiological emergency in line with…"	According to paragraph 5.41 of GSR Part 7	Accepted			
33 IRAN	Paragraph 2.22/ First line	"2.22. In the design of the means for information exchange and communication ~~system~~ to be used…"	Clarification is necessary.	Accepted			

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6							
34 GER-NUS 5 (1)	Headline before para. 2.25	**Authorized dose limits and dose constraints for operational states, accident conditions and decommissioning**	According to SSR 2/1 the design of an NPP shall cover operational states (NO and AOO) as well as accident conditions (DBA and DEC). It is expected that radiation protection of workers and the public is considered for all plant states, not only operational states (see Requirement 4 of SSR 2/1). In addition see paras. 4.4 to 4.11 of SSG-2 Rev. 1.			Rejected	The title above para. 2.25 indicates 'operational states' and paras 2.25 and 2.26 only apply to NO and AOO. See new paras 2.29A and 2.30A in the Resolution to comment 2 (GER-NUSS 1).
35 GER-NUS 6 (1)	2.25	The design of the nuclear power plant should be such as to ensure that authorized dose limits and dose constraints[2] for site personnel and the public will not be exceeded over specified periods (e.g. monthly, quarterly, or annually) in operational states (normal operation, ~~and~~ anticipated operational occurrences and design basis accidents) and decommissioning.	For new reactor concepts design basis accidents shall be managed without exceeding dose limits for exposed workers.			Rejected	Para. 2.25 applies to operational states. See resolutions to comments 34 (GER-NUS 5) above and 2 (GER-NUS 1) (added paras 2.29A and 2.30A).
36 JAPAN RASSC 1	2.25, line 2 Footnote 2 (page 16)	**Dose limits for occupational exposure and public exposure are established by the government or the regulatory body. Relevant dose constraints for occupational exposure are established and used by registrants and licensees,**	Consistency with GSR Part 3 (i.e., Requirements 11 on Optimization of protection and safety,	Accepted	*In para. 2.25, footnote 2 will be modified:* [2] Dose limits for occupational exposure and public exposure are established by the national regulation		The term 'registrants' usually refers to users of radiation sources. In this para./ footnote it seems

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		and those for public exposure are established or approved by the government or regulatory body ~~An authorized dose limit or dose constraint is one that has been established or formally accepted by a regulatory body~~. For internal exposures, such as those that result from the inhalation and ingestion of radioactive substances, the dose limits apply to the committed dose. See also the IAEA Safety Glossary [13].	and Requirement 12 on Dose Limits).		~~government~~ or by the regulatory body. Relevant dose constraints for occupational exposure are established and used by ~~registrants and~~ licensees, and dose constraints ~~those~~ for public exposure are established or approved by the national regulation ~~government~~ or by the regulatory body ~~An authorized dose limit or dose constraint is one that has been established or formally accepted by a regulatory body~~. For internal exposures, such as those that result from the inhalation … ".		sufficient to refer to the 'licensee'.
37 GER-EPR 5	2.26	…the population~~.~~ (See the IAEA Safety Glossary [13], GSR Part 3 [2] and GSG-9 [20]).		Accepted			
38 EGYPT 1	2.26 *(implemented in 2.18)*	Add this sentence to para 2.26 The assessment of environmental impacts shall conduct and keep it up to date			*The recommended text fits to para. 2.18, so that para. will be modified as follows:* 2.18. Recommendations of NS-G-3.2 [19] and GSG-10 [19C] on prospective radiological impact assessment of the protection of the public and the		There are several paras in sections 2 and 3 dealing with the assessment of environmental impacts (e. g. 2.14, 2.18, 2.31), that already cover the recommended text.

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					environment should be taken into consideration during the design stages and plant modifications and should be kept updated during operation.		The recommended text fits better with para 2.18 and the reference to GSG-10 [19C] is added there.
39 JAPAN (NUSSC) 2	2.27.	OPTIMIZATION OF RADIATION PROTECTION AND SAFETY Application of the optimization principle 2.27 The design should ensure that protection and safety is optimized. Requirement 11 of GSR Part 3	To clarify that the subject of this subsection is "radiation" protection.	Accepted			
40 GER-EPR 6	2.28	"2.28. To keep all exposures within authorized dose limits and dose constraints and as low as reasonably achievable, economic and social factors should be ~~being~~ taken into account: …"			*Initial part of para. 2.28 will be modified:* "2.28 To keep all exposures within authorized dose limits and dose constraints and as low as reasonably achievable, economic and social factors ~~being~~ are taken into account:		As economic and social factors are not safety factors, it seems preferable to only use 'should statements' in the two bullets, as it is formulated in NS-G-1.13.
41 S. AFRI 6	2.28	The radiation exposure should be reduced by means of radiation protection measures to values such that further expenditure for design, construction and operation would not be warranted.	It is proposed that the text "(economic factors) by the associated reduction in radiation exposure" be deleted as economic factors are already mentioned in the first phrase of 2.28 and that the text "by		*An editorial change will be made in first bullet of para. 2.28:* "— The radiation exposure should be reduced by means of radiation protection measures to values such that further expenditure for design, construction and		Last part of the sentence could be deleted. However, at the moment it seems better to keep the wording used in the existing Safety Guide (see para. 2.4 of NS-G-1.13).

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			the associated reduction in radiation exposure" be deleted as the words "by the associated reduction in radiation exposure" duplicate the words "The radiation exposure should be reduced" already used earlier in the same sentence.		operation would not be warranted ~~(economic factors)~~ by the associated reduction in radiation exposure (economic factors).		
42 S. AFRI 7	2.29.	~~To this end~~, feasible options should be identified, criteria for comparison and appropriate values for them should be determined and, finally, the options should be evaluated and compared.		Accepted			
43 GER-NUS 7 (1)	2.29	In general, the optimization of radiation protection implies a choice from a set of protective measures and design options such as shielding, avoiding materials which can be easily activated, removal of radionuclides from coolants, filtering of air in working areas, remote operation and tooling to minimize radiation exposure time. (…)	We propose to add some more examples, where an appropriate design could contribute by technical design solutions to the reduction of the exposure of workers.		*First sentence of para. 2.29 will be modified as follows:* "2.29. In general, the optimization of radiation protection implies a choice from a set of protective measures, including design options, such as shielding, avoidance of materials that can be easily activated, minimization of surfaces that can be easily contaminated, removal of radionuclides from coolants, filtering of air in working areas, remote operation and		See also comment 45 (ONR UK 1) to this para.

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					tooling to minimize radiation exposure time…"		
44 GER-NUS 8 (1)	2.28 or 2.29	"… evaluated and compared. Radiological acceptance criteria are discussed in paras. 4.8 and 4.9 of SSG-2 Rev. 1 for normal operation and anticipated operational occurrences, respectively. Details of different…"	Radiological acceptance criteria for normal operation and anticipated operational occurrences are discussed in paras. 4.8 and 4.9 of SSG-2. A reference should be added by insertion of the proposed sentence either in para 2.28 or in para 2.29.		*Para. 2.29 will be also modified as follows:* "… evaluated and compared. Radiological acceptance criteria for normal operation and for AOOs are discussed in paras. 4.8 and 4.9 of SSG-2 (Rev. 1) [29], respectively. Details of different structured approaches …".		
45 ONR UK 1	Paragraph 2.29	"2.29. In general, the optimization of radiation protection implies a choice from a set of design features and protective measures such as shielding, remote operation and tooling to minimize radiation exposure time. To this end, feasible options should be identified, criteria for comparison and appropriate values for them should be determined and, finally, the options should be evaluated and compared. Details of different structured approaches to making decisions are given in Appendix."	Suggested adding "design features". It's not just protective measures but also the design itself which contributes to optimization of radiation protection.		See resolution to comment 43 (GER-NUS 7).		
46 GER-NUS 9 (1)	2.30	The concept of optimization should also apply to design features whose purpose is to prevent or mitigate the consequences of accidents at the plant that could lead to the exposure of site personnel and/or the public ~~taking into account probability of accident~~	Para. 4.4 of SSG-2 Rev. 1 seems to be more clear on this topic. We propose to combine para. 2.30	Accepted	*The para. 2.30 will be modified:* "2.30 The concept of optimization should also apply … exposure of site personnel and/or the public.		The text recommended to delete was not included in the para 2.30.: ~~Acceptance criteria should relate to the frequency of the relevant conditions~~.

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		~~conditions. Acceptance criteria should relate to the frequency of the relevant conditions~~. Conditions that occur more frequently, such as normal operation or anticipated operational occurrences, should have radiological acceptance criteria that are more restrictive than those for less frequent events, such as design basis accidents or design extension conditions.	with para. 4.4 of SSG-2 Rev. 1.		~~taking into account probability of accident conditions.~~ Conditions that occur more frequently, such as normal operation or anticipated operational occurrences, should have radiological acceptance criteria that are more restrictive than those for less frequent events, such as design basis accidents or design extension conditions. (see para 4.4 of SSG-2 (Rev. 1.) [29]).		
47 S. AFRI 8	After 2.31	The safety guides providing recommendations to meet the requirements of GSR Part 3 [2]	This should be a new sub-heading following Optimization of Protection and Safety			Rejected	The para 2.31 is placed under the sub-headings 'OPTIMIZATION OF RADIATION PROTECTION AND SAFETY' and 'Application of the optimization principle'. It seems that adding the new sub-heading suggested after 2.31 would not contribute to the clarity of this part of the section.
48 S. AFRI 9	2.33	This should be a new sub-heading following Optimization of Protection and Safety	Editorial			Rejected	The change seems not necessary. The para. 2.33 is placed under the sub-headings 'OPTIMIZATION OF RADIATION

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
							PROTECTION AND SAFETY' and 'Minimization of radioactive waste'.
49 EGYPT 2	2.33	…in accordance with Requirement 8 of GSR Part 5 [7] ~~"Radioactive waste generation and control"~~ in order to protect workers,	Delete this sentence in order not to repeat it because it is mentioned at the bottom of the paragraph in detail		Titles of the requirements in para. 2.33 will be removed.		These and other titles were kept in the draft for convenience. Final formulation will be fixed at a later stage, during Technical Editorial review.
50 S. AFRI 10	2.34	The design for radiation protection should meet the optimization requirements established by the national regulatory ~~authority~~ body for any persons who are exposed as a result of activities in the nuclear power plant,….	As per the IAEA glossary, the term regulatory body supersedes regulatory authority.	Accepted			
51 S. AFRI 11	2.38	To ensure that a design both reduces doses to levels that are as low as reasonably achievable and represents best practice, design targets should be set for the individual dose and collective dose to workers and for the individual dose to the representative person.	Repetition. Representative person dose is an individual (hypothetical) dose.		*The para. 2.38 will be modified as follows:* "… for the individual dose and collective dose to workers and for the individual dose to the representative person of the public. The setting of design targets …"		First part of the sentence is for workers and the representative person is a member of the public.
52 S. AFRI 12	2.38 Line 3	"… The setting of design targets for individual doses to site personnel and members of the public ~~is~~ should be consistent with the concept of dose	To be consistent with the language used for a guide	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		constraints, which is discussed in GSR Part 3 [2].					
53 GER-EPR 7	2.38		Please place the note in the footer. See also para 4.12	Accepted			Applicable text placed as footnote in para 2.38 and 4.12
54 EGYPT 3	2.38	It is proposed that the sentence: (the setting of design targets for individual doses to site personnel and members of the public….) to be replaced by design target doses should be set for individual doses and the collective doses to workers and individual dose targets for public members.				Rejected	See resolution to comment 51 (S. AFRI 11) and other comments about this para. In the sentence, the recommendation refers to dose constrains ("…The setting of design targets for individual doses to site personnel and members of the public is consistent with the concept of dose constraints…"
55 GER-EPR 8	2.40	The design target for the long term collective dose should preferably be expressed in terms of ~~man~~ person Sv/MWh of electricity generation, indicating the ratio of the radiation detriment to the benefit (the energy produced).	To be commensurate with the IAEA Glossary.		The para 2.40 will be deleted in accordance with resolution of comment 56 (GER-NUS 10)		
56 GER-NUS 10 (1)	2.40	~~The design target for the long term collective dose should preferably be expressed in terms of man Sv/MWh of electricity generation, indicating the ratio of the radiation detriment to the benefit (the energy produced).~~	We propose to delete para. 2.40 because radiation exposure of workers does not necessarily scale with the thermal or electric power generated by a nuclear power plant. The proposed term	Accepted			The para. 2.40 corresponds to para. 2.9 of NS-G-1.13; is for that it was included in the initial draft of DS524.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			will promote large NPPs. The objective of this safety guide is on minimizing exposures as far as reasonable practicable (ALARA) and not on justification (benefits versus detriments). According to requirement 10 of GSR Part 3 the government or regulatory body is responsible for justification of practices. If NPPs are allowed in a country, this practice is already justified by the government.				
57 GER-NUS 11 (2)	2.41	2.41. The adequacy of the design provisions for the protection of the site personnel and public under accident conditions should be judged by means of the comparison of calculated doses with the specified dose criteria (radiological acceptance criteria, see paras. 4.10 and 4.11 of SSG-2 Rev. 1) that constitute the design targets for accidents. …"	Radiological acceptance criteria for accident conditions are also discussed in SSG-2 Rev. 1. We propose to add a link to the relevant paras. Of the above-mentioned safety standard.	Accepted			
58 SWEDEN	2.41 6.7 6.27	dose criteria (radiological acceptance criteria in SSG-2 rev 1 [29])	Is it the "radiological acceptance criteria" from SSG-2 on		See above the resolution to comment 57 (GER-NUS 11)		

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1			deterministic safety analysis that is intended? If so, please clarify this. Consider the proposed text.				
59 SWEDEN 2	2.41	*Too involved comment to propose text*	According to 2.41, "the adequacy of the design provisions for the protection of the site personnel under accident conditions should be judged by means of the comparison of calculated doses with the specified dose criteria (radiological acceptance criteria)". If the "radiological acceptance criteria" from SSG-2 on deterministic safety analysis is intended, SSG-2 does not provide guidance for on-site personnel (apart from "control locations", see 7.60 § of SSG-2). COMMENT: Could a clarification, additional guidance or		*First two sentences of para. 2.41 will be completed as follows:* "2.41 The adequacy of the design provisions for the protection … with the specified dose criteria (radiological acceptance criteria; see paras 4.10 and 4.11 of SSG-2 Rev. 1 [29]) that constitute the design targets for accidents. In general, the higher the probability of the accident condition, the lower the specified design target should be (see also para. 2.30A). The regulatory body … "		

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			examples be provided on how the adequacy of the design provisions for the protection of the on-site personnel could be judged by means of the comparison with "dose criteria" or "radiological acceptance 24rioriti", since GSR part 3, SSR-2/1 and SSG-2 does not provide such guidance (at least not that we can find).				
60 EGYPT 4	2.41	The following sentence is proposed to be added to this para it is beneficial to address design basis accidents and beyond design basis accidents separately. In the case of beyond design basis accidents, it is appropriate to set design target doses. In addition to providing assurance to the regulatory body, design target doses may be set to meet the concerns of members of the public				Rejected	The para. 2.41 covers both DBA and DEC. There are other paras (e. g. 2.16 and 2.17) where DBA and DEC is covered separately. In the IAEA Safety Standards, which are consistent with the Safety Glossary (Edition 2018) the term Design Extension Conditions (DEC) is used instead of 'beyond design basis accidents'.
61 S. AFRI	2.42	"2.42. Planning for decommissioning begins at the design stage … Recommendations related to specific design features of radiation protection in	Editorial. The word "are" was missing in this sentence.	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
13		design for decommissioning are provided in Section 7 of this Safety Guide."					
62 EGYPT 5	Before para 2.42.	This sentence is proposed to be added under the title (Design targets for decommissioning) To implement this structured approach, the designer should have an appropriate safety culture in which the importance of radiation safety and of the safety of radioactive waste at each stage of the design is recognized. As part of the application of the optimization principle at the design stage, project management should set up a system of shared knowledge and common objectives and attitudes to ensure that the management of occupational exposure and public exposure benefits from the cooperation of all personnel who are involved in the project.				Rejected	This is discussed in Section 3 of DS524 and, in particular, covered by paras 3.5 - 3.11 and 3.58 - 3.60.
63 S. AFRI 14	2.43	The paragraph 1.20. of GSR Part 6 [8] states that: The design team-should be fully	Editorial			Rejected	The quotation included in para. 2.43 of DS524 is correct.
64 S. AFRI 15	2.46	… or to require confinement of releases of radioactive material under emergency conditions, other IAEA safety standards apply GSR Part 3 [2] and GSR Part 7 [9]."	The closing quotation mark was missing in this sentence.	Accepted			
SECTION 3							

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
65 EGYPT 6	3.1	SOURCES OF RADIATION -Neutron and gamma radiation from the comprehensive and spent fuel pool -The activation radiation of the internals and reactor pressure vessel material -The reactor coolant changes to (primary coolant and secondary coolant in case of leakage) - Steam supply system, feedwater system and turbine generators (In some types of reactors such as the Boiling-water reactor BWR) only	It is proposed for more clarification		*First bullet of para. 3.1 will be modified as follows:* "-the reactor core, reactor internals and vessel" *After the bullet on 'irradiated fuel' a new bullet will be inserted:* "- spent fuel pool". *All the other items in the list of bullets remain unchanged.*		The newly proposed bullets would be too detailed as compared to the other (higher level) bullets.
66 GER-RASS 7 (3)	3.3. last line	… metal clad fuel heavy water reactors (HWR) and reactors with on-load refueling.	Please write out the abbreviation.	Accepted			
67 USA (to NSGC) 3	Page 24, para 3.5 and Page 26, para 3.54	Recommend that the term "safety culture" rather than Human resources be used in these sections. (In many countries the term "human resources" refers to the personnel of a business or organization. In this context, suggest that in the paragraphs discussing safety culture, that a reference to security culture also be included. This can be accomplished by referencing IAEA Technical Guidance No. 28-T, "Self-assessment of Nuclear			*The title above para 5.5 will be modified as follows:* Human resources ~~Design team~~ and operational experience *In addition, the recommended guidance document will be referenced:*		Using 'safety culture' in the title would be too narrow for the section. The term 'human resources" is used only once (in the title) in the whole draft.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		Security Culture in Facilities and Activities"			IAEA Technical Guidance No. 28-T, Self-assessment of Nuclear Security Culture in Facilities and Activities		
68 S. AFRI 16	3.6	aware	Editorial	Accepted			The word 'fully' will be deleted
69 USA-2 12	Para 3.10	For the first bullet, revise "transport on" to "transport in"	Editorial	Accepted			
70 GER-NUS 12 (2)	3.11	"3.11. Due to the importance of chemical parameters in controlling the radioactive sources in the plant, specialists in reactor chemistry should also be involved in the design process. Materials specialists should be involved in controlling the source term due to corrosion products. This also refers to the ~~decommissioning phase where~~ chemical decontamination processes to be performed during operation and in the decommissioning phase.	Chemical decontamination is also performed during operation. Operational experience showed, that this may have an impact if chemical decontamination is not executed in the intended way and may have an impact on nuclear safety.		*Last sentence will be modified as follows:* "… This also refers to the ~~decommissioning phase where~~ chemical decontamination processes that are ~~to be~~ performed during operation and in the decommissioning phase.		
71 GER-EPR 9	3.11 Line 3	"… This also refers to the decommissioning phase where chemical decontamination processes ~~to be~~ are performed."	Editorial	Accepted	*See resolution to comment 70 (GER-NUS 12)*		
72	Para 3.11, line 4	Add "are" before "to be performed"	Editorial	Accepted	*See resolution to comment 70 (GER-NUS 12)*		

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
USA-2 13							
73 GER-NUS 13 (3)	3.12 Line 5	"… ~~A m~~Means should be provided of ensuring that the designers take into account ……"	Wording	Accepted			
74 GER-NUS 14 (1)	3.12 2nd bullet	- ~~Written policies on such issues as the optimum use of respiratory protection;~~	Use of respiratory protection belongs to personal protective equipment. From a safety engineer point of view, it belongs to the less effective means of protecting workers. First, the design shall be such that use of personal protective equipment is minimized. Where no adequate technical means are possible, personal protective equipment should be utilized. For that reason, we propose to delete this item.		*Second bullet will be modified as follows:* "~~-Written policies on such issues as the optimum use of respiratory protection;~~ Design measures to minimize the use of respiratory protection;"		
75 S. AFRI 17	3.13	No suggested text	3.13	N/A	N/A	N/A	No suggestion/reason is provided
76 BELGIUM	3.13 & Several other lines	Sometimes, listed items end with the punctuation "." And sometimes with ";"	For consistency, the same punctuation	Accepted	*No changes in the para are deemed necessary.*		The para. 3.13 of DS524has no changes as compared to

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1		Other lines where this appears are 3.27, 5.17, 5.19(4), 5.53(2), 5.109(1), 6.1I, 7.19, 7.21(4), 7.55(b), 8.11(2), I-4, I-5, I-107, I-141, I-142 and I-149	should be used systematically				para. 3.11 of NS-G-1.13, including 'punctuation'. This aspect will be fixed during Technical Editorial review and final Editing of the draft in accordance with the IAEA Style Manual for Publications.
77 FRANCE 1	3.16	Add the sentence : " Specific dose targets should be establish for operations carried out when the reactor is in operation and operations carried out during outages."	A significant proportion of doses is received during outages. Depending on the reactor design, the frequency of outages may be more than one year. As a result, the definition of an annual dose target may not always be relevant		*Before the last sentence of the para., a new sentence will be inserted as follows:* "Specific dose targets may be established for operations carried out when the reactor is in operation and for operations carried out during outages".		It seems more appropriate to provide the recommendation.
78 GER-NUS 15 (1)	3.17	~~In practice, these design targets can be addressed independently from each other, although in principle any enhancement of waste treatment systems to reduce the releases of radioactive substances to the environment may result in additional work being carried out by site personnel with a consequent increase in their exposures. In providing the best practicable means for reducing releases, the implications for the exposures of site personnel should be~~	First, exposure of workers are not only due releases, but also to direct exposure and contamination/ incorporation of radionuclides present in the working area. As the guide is on design, this paragraph reads more on modification of waste		*Second sentence of para. 3.17 will be modified as follows:* "… In providing the best practicable means for reducing releases, the implications for the exposures of site personnel should be ~~monitored~~ taken into account, to ensure that there is no undue increase."		The first sentence does not provide recommendations (it is an explanatory text) and could be deleted. However, it is suggested to keep it as it corresponds to para 3.15 of NS-G-1.13 and has a link with previous para. 3.16. Second sentence provides a relevant recommendation,

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		~~monitored to ensure that there is no undue increase.~~	treatment facilities and balancing the exposure of workers implementing the modifications against the benefit of reducing releases. However, this is also true for other modification rather than the waste treatment systems.				and it seems batter to keep it.
79 ONR UK 2	3.19 Figure 1	Add a box above Cost Benefit Analysis with the text, "comparison against national and international good practice standards"	Cost Benefit Analysis is one example of a method which might be used to ensure doses are reduced as low as reasonably achievable. Comparison against national and international relevant good practice is an important step in the optimisation process.		*A new box will be added above the box 'Cost-benefit analysis', as recommended, including the following text:* "Comparison against national and international standards and good practices"		
80 SWEDEN 3	3.20 (2)	Make (2) number 1 in the list.	As written the list could be interpreted as a prioritized list, as such bullet number (2) should come before bullet number (1), since deprival of general requirements and principles for	Accepted	*Items (1) and (2) will be shifted in the list.*		

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			layout should be done before looking into individual components as discussed in present bullet (1).				
81 JAPAN (NUSSC) 3	3.20 (1)	(1) A strategy for controlling exposures should be developed so that the most important aspects are considered early in the design and in a logical order. For example, in many reactor designs, two areas in which there is a major potential for reducing exposures are scheduled and unscheduled maintenance. For example, i~~I~~n some designs of PWRs, two of the plant items that are important contributors to radiation exposures during maintenance are the steam generators and valves in the systems that contain. These should therefore be considered first in the stage of design and it should be ensured that ~~the reliability of~~ the design has been proven. This will reduce exposures to levels that are as low as reasonably achievable and will also help to improve the ~~efficiency~~ plant availability and therefore the economic performance of the plant.	Clarify that PWR is used as an example. Also, if valves are taken as an example of items, it is better to limit them to valves of the system that handles primary water. The meaning of the fourth and subsequent sentences is not clear. The description should be corrected according to Fig 2. -Clarify that exposure reduction should be considered at the stage of design. -Exposure reduction measures contribute to plant availability such as shortening of periodic inspections rather than plant		*The wording recommended for the **first part** of this item (now item (2)) will be modified as follows:* "(~~1~~2) A strategy for controlling exposures … are scheduled and unscheduled maintenance. For example, i~~I~~n some designs of PWRs, two of the plant items that are important contributors to radiation exposures during maintenance are the steam generators and valves in systems containing radioactive coolant. These should therefore be considered first in the stage of design and it should be ensured that ~~the reliability of~~ the design has been proven. This will reduce exposures to levels that are as low as reasonably achievable and will also help to improve the ~~efficiency~~ plant availability		See resolution to comment 80 (Sweden – 3). The wording recommended for sentence three has been slightly modified and completed.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			efficiency. (Generally, plant efficiency means thermal efficiency.)		and therefore the economic performance of the plant. The second area that should be considered …"		
82 EGYPT 7	3.20 (1) Line 12	" … such as increasing the shielding ~~or~~ and improving ventilation …"	Because both increased shielding and improving ventilation are essential to reduce radiation and contamination levels	Accepted			See resolution to comment 80 (Sweden – 3).
83 GER-RAS 8 (3)	3.20. line 6	In some designs of pressurized water reactors (PWR), two of the plant items …	Please write out the abbreviation.	Accepted			
84 S. AFRI 18	3.20 (4) Line 4	" … For tasks for which doses are predicted to be relatively ~~minor~~ low, …"	More appropriate wording			Rejected	Text of 3.20 corresponds to para 3.18 of NS-G-13 with minor changes. Original wording utilizes the term 'minor', and it could be replaced by 'low'. However, it seems not clear that the change represents an enhancement.
85 USA-1	3.20 (4) Line 7	Types of worker include maintenance personnel, in-service inspection personnel, ~~electrical staff,~~ support staff (e.g.	Electrical staff are considered maintenance personnel. If this	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1 *(In USA-3 is identified as comment 7)*		scaffolders), decontamination staff and health physics staff.	document identifies electrical staff, then other staff such as I/C should also be identified.				
86 USA-1 2 *(In USA-3 identified as comment 8)*	FIG 2.	Optimized system design - Optimize space and access - Remove unwanted ~~activity~~ activated corrosion product traps …	The term "activity" is ambiguous. Use either 'activated corrosion product' or 'CRUD'	Accepted			
87 GER-EPR 10	3.20 FIG 2. Page 29	*"Fig. 2. A simplified strategy for the reduction of exposures in the plant (dashed for a PWR)."*	There is no dashed line in the figure. Please add dashed lines or delete parentheses.	Accepted	*The title will be corrected as follows:* *Fig. 2. A simplified strategy for the reduction of exposures in the plant* ~~*(dashed for a PWR).*~~		
88 GER-RAS 9 (3)	3.22. first line	In pressurized heavy water reactors (PHWR), for which an important contributor …	Please write out the abbreviation.	Accepted			
89 GER-NUS 16 (1)	3.25 (1) 4th item	- Improvement of filtered ventilation, especially in PHWRs.	Ventilation systems should be equipped with adequate filtering to remove airborne radionuclides from air. The helps to reduce exposure in	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			working areas and reduces releases to the environment via exhaust.				
90 GER-NUS 17 (1)	3.25 (2) 5th item	- ~~Ensuring mockup training for maintenance staff.~~	We agree, that mockup training is an efficient mean to reduce occupancy times to minimize exposure of workers. But we consider this more as an operational issue rather a design issue.	Accepted			
91 EGYPT 8	3.25	(1) Reduction of dose rates in working areas by: • Reducing working time in controlled areas • Reducing surface and airborne contamination; • Optimizing the number of workers in the work team • Identifying low dose areas where workers can go without leaving the controlled area if their work is interrupted for a short time. • Evaluation of dose rates distribution through the plant taking into account different operation modes • Use of the remote apparatus for control over condition of the main equipment of NPP and	It is proposed to add these bullets for more clarification		*First bullet of item (1) will be completed as follows:* "— Reduction of sources (e. g. by the appropriate selection of materials; reducing surface and airborne contamination; decontamination measures; the control … from the primary systems);" *In item (2), a new bullet will be added, at the end of the list:* "- Optimizing the number of workers and their time in the radiation field by design means."		The list of items are examples. The other recommended items are either too detailed or already implicitly included.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		development of motorized repair furniture					
92 JAPAN RASSC 2	Para. 3.27 (page 31)	"3.27. The design targets should be achieved in the following way: — Site specific features that affect the doses to members of the public should be identified at an early stage of the design process and taken into account in the design (see GSG-10 [19C]). This should include the identification of the representative ~~reference~~ person and the exposure pathways for the representative ~~reference~~ person, which should be subject to the approval of the regulatory body. — One possible approach would be to set targets for radioactive releases for which account is taken of operational experience and the use of best practicable means in the design of the treatment systems for radioactive effluents. — The resulting doses to the representative ~~reference~~ person should be evaluated to ensure achievement of the target.	Consistency with GSR Part 3. The representative person is defined as an individual receiving a dose that is representative of the doses to the more highly exposed individuals in the population (page 419, Definitions, GSR Part 3).	Accepted			
93 ENISS 1	3.27	"3.27. The design targets should be achieved in the following way: — Site specific features that affect the doses to members of the public should be identified at an early stage of the design process and taken into account in the design (see GSG-10 [19C]). This should include the identification of the reference person and the exposure pathways for the	Please clarify the difference between *representative* person in other paras and *reference* person in this case.	Accepted			See resolution to comment 92 (JAPAN – RASSC – 2)

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		reference person, which should be subject to the approval of the regulatory body.					
94 GER-NUS 18 (1)	3.28	"3.28. ~~The design should be such as to ensure that the contamination of material that leaves plant can be adequately monitored.~~ Activity monitors should be installed at the gates to ensure that no radionuclides leave or unintentionally enter the plant.	Assuming that 3.28 addresses activity monitoring at the entry/exit gates of the plant, it should not be restricted to contamination. Also important is the detection of radionuclides unintentionally entering the plant because it will lead to unexpected exposures and increases the number of radionuclides the plant has to deal with and thus contributes to the minimization principle.	Accepted			
95 JAPAN EPReSC 1	3.29	"3.29. A radiological environmental impact assessment should be carried out in accordance with ~~GS-G-3.2~~ GSG-10 [~~19~~ 19C] to inform the optimization process being applied to doses to members of the public and to ensure that the design complies with national ~~limits and regulatory expectations~~ regulatory requirements and defining appropriate dose targets."	Clarification		The para. 3.29 will be modified as follows: " 3.29. A radiological environmental impact assessment should be carried out in accordance with NS-G-3.2 [19] and GSG-10 [19C] to inform the optimization process being applied to doses to members		Both safety guides are relevant here and should be mentioned.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
					of the public and to ensure that the design complies with national ~~limits and~~ regulatory ~~expectations~~ requirements and ~~defining~~ appropriate dose targets."		
96 JAPAN (NUSSC) 4	3.29	A radiological environmental impact assessment should be carried out in accordance with GS-G-3.2 [19] to inform the optimization process being applied to doses to members of the public and to ensure that the design complies with national limits and regulatory expectations and defining appropriate dose targets.	Please clarify regulatory expectations. Does they mean requirements or any other demand?		See resolution of comment 95 (JAPAN – EPReSC – 1)		
97 JAPAN RASSC 3	Para. 3.29 (Page 32)	3.29. A radiological environmental impact assessment should be carried out in accordance with N~~G~~S-G-3.2 [19] to inform the optimization process being applied to doses to members of the public and to ensure that the design complies with national limits and regulatory expectations and defining appropriate dose targets.	Editorial		See resolution of comment 95 (JAPAN – EPReSC – 1)		
98 GER-EPR 11	3.33 Line 4	"… Appropriate arrangements should be established ~~as soon as~~ before the nuclear fuel is first brought into the site and crosses the plant fences. The emergency plan and all emergency arrangements should be completed before the commencement of fuel loading.	Measures for emergency arrangements (including emergency plans) and radiation protection should be established before the nuclear fuel is brought into site in order to ensure proper	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			protection for personnel and environment. Para 3.45 states "Radiation protection infrastructure should be available sufficiently before the planned introduction of radioactive sources or fuel in order to fully establish the radiation protection programme and to ensure that all radiation monitoring equipment is tested and functioning correctly, as recommended in paras 3.33, 3.48, 3.61, 4.28, A-2, A-3 and A-14 of SSG-28 [36]." To be commensurate with this statement the proposal should be adopted.				
99 ONR UK 3	Paragraph 3.33.	Measures provided in the design for emergency arrangements and for radiation protection should be appropriate for maintaining safety in the event of an accident; mitigating the consequences of	Suggest change to wording. Arrangements should be established prior to the fuel arriving on site.	Accepted			Same resolution as the one for comment 98 (GER-EPR 11)

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		accidents if they do occur; protection of site personnel and the public; protection of the environment in accordance with para 5.2 of SSR-2/2 (Rev. 1) [3]. Appropriate arrangements should be established ~~as soon as~~ before the nuclear fuel is first brought into the site and crosses the plant fences. The emergency plan and all emergency arrangements should be completed before the commencement of fuel loading.					
100 S. AFRI 19	3.35	DESIGN CONSIDERATIONS FOR COMMISSIONING AND OPERATION ~~AND COMMISSIONING~~	In the heading just before 3.35, OPERATION and COMMISSIONING needed interchanging to reflect their chronological and logical ordering.	Accepted			
101 ONR UK 4	Add text after paragraph 3.41	"… optimized during maintenance. During fuel transfer from the reactor building to spent fuel pool the dose rate in the peripheral area of the reactor building will increase due to the reduced shielding. This requires additional shielding."	Proposal for additional text in relation to PWRs. Suggest adding after paragraph 3.41 or other suitable place.		*The para. 3.41 will be completed as follows:* "… optimized during maintenance. Specific shielding should be considered in the design for the optimization of the dose rate in the peripheral area of the reactor building during fuel transfer from the reactor building to the spent fuel pool."		The recommended text (idea) has been transformed into a 'should statement'.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
102 EGYPT 9	3.43	This para is proposed to be changed to the new text: Provisions for access and exit control points and facilities such as monitoring and registration of personnel access to the plant-controlled area with personnel protective equipment's, contamination monitors for exit ……			*The existing para. 3.43 will be replaced by the following text:* "Provisions should be considered in the design for efficient access and exit control points and facilities, such as monitoring and registration of personnel accessing the plant-controlled area with personnel protective equipment's. Contamination monitors should also be considered in for exit control logistics during outages, periods having increased staffing."		The recommended text has been completed and adapted to the relevant section ('Access to and exit from controlled areas').
103 GER-EPR 12	3.51 Line 4	The principal design measures that are taken to protect the public against the possible radiological consequences of accidents are required to have the objectives of reducing the probability that accidents will occur (prevention of accidents) and reducing the source term and releases (mitigation of consequences) associated with accidents if they do occur (see SSR-2/1 (Rev. 1) [1]).	Editorial	Accepted			
104 JAPAN RASSC 4	Para. 3.51 (Page 35)	3.51. The principal design measures that are taken to protect the public against the possible radiological consequences of accidents are required to have the objectives of reducing the probability that accidents will occur (prevention of	Clarification. In para. 3.51, the ICRP Pub. 42 suddenly appears as a reference on accident prevention, but the	Accepted			The references will be updated, including adequate ICRP publications and other references (e. g.it the ICRP Publication 103 (2007); ICRP Publication

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		accidents) and reducing the source term and releases (mitigation of consequences) associated with accidents if they do occur SSR-2/1 (Rev. 1) [1]. Accident prevention is not explicitly addressed in this Safety Guide, but reference should be made to the available relevant information (e.g. see TECDOC-1127 [39] and ICRP Publication XX [YY] ~~42 [40]~~). *(replaced by an appropriate publication)*	reason why it should be referred to is unclear, while TECDOC-1127 is an appropriate example. If an ICRP publication on major concepts and quantities used for radiological protection is to be cited, the appropriate publication based on ICRP 2007 Recommendations, on which GSR Part 3 is based, should be cited here.				64 (1993); GSR Part 3, para. 3.120; GSG-10, ICRPs 3 and 51 and INSAG 9 will be considered).
105 GER-NUS 19 (2)	3.52	"3.52. The design objectives for accident conditions are to limit exposures and releases to acceptable levels and to optimize:	Clarification. Something seem to be missing in the sentence. We guess, limitation of exposures and releases should be addressed here.		The para. 3.52 will be modified as follows: "3.52. The design objectives for accident conditions are to limit exposures and radioactive releases to acceptable levels and to optimize: …" (1) the risks...		
106 JAPAN EPReSC 2	3.52 Line 8	"… Deterministic safety analysis and the associated dose assessments, complemented by probabilistic safety assessments, for demonstrating compliance with the ~~radiation dose limits~~ acceptance criteria should be based on conservative assumptions …. These issues	This paragraph deals with the design considerations for accident conditions and should be consistent with for example, paragraph	Accepted			See also resolution to comment 2 (General Comments; GER-NUS 1) at the beginning of the table.

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		are discussed in Section ~~5~~ **6** of this Safety Guide and ….	6.27 of this Safety Guide				
SECTION 4							
107 GER-EPR 13	4.2	"4.2. Recommendations on estimating radiation doses during operation and decommissioning are provided in this section in accordance with the scope of this Safety Guide, e.g. ~~no~~ recommendations are provided on calculational methods or values of the parameters to be used to evaluate the radiation dose rates expected to occur during operation and decommissioning	Para 4.3 actually gives recommendations on calculation methods.			Rejected	Only the general principles of a calculation approach are provided, not calculation methods. There are no values of parameters to be used to calculate the dose rates.
108 GER-NUS 20 (1)	4.4	~~According to para 2.47 of GSG-7 [10] internal doses cannot be measured directly; they can only be inferred from individual measurements of other quantities, such as measurements of activity in the body or in excretion samples. For situations where intake below the threshold accepted by the authorities or well below dose limits for intake is expected, instead of individual monitoring, the internal exposure of workers may be assessed on the basis of workplace monitoring and other relevant information such as location and durations of exposure (e.g. atmospheric activity or surface activity of the deposit and resuspension factor). Other recommendations on the assessment of internal exposure are provided in paras 7.133–7.227 of GSG-7 [10].~~	Para. 4.4 is out of the scope of this safety guide. As 4.4 refers to measurements, para. 4.4 is more related to operational radiation protection rather than design. During the design phase, internal exposures have to be estimated based on the activity concentration in air or for the public based on assumed intakes of the reference person.		*The para. 4.4 will be modified as follows:* 4.4. ~~According to para 2.47 of GSG-7 [10] internal doses cannot be measured directly; they can only be inferred from individual measurements of other quantities, such as measurements of activity in the body or in excretion samples. For situations where intake below the threshold accepted by the authorities or well below dose limits for intake is expected, instead of individual monitoring, and other relevant information~~		Complementary information is needed to calculate the atmospheric activity.

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					~~such as location and durations of exposure (e.g. atmospheric activity or surface activity of the deposit and resuspension factor).~~ During the design phase, the requirement to provide equipment to assess internal exposures should be considered. The calculation of internal exposure of workers is based on the duration of exposure at the workplace, the atmospheric activity, including activity coming from surface activity of the deposit (use of resuspension factor), the radionuclides involved, the particle size distribution, the breathing rate and dose coefficients factors. ~~Other~~ Recommendations on the assessment of internal exposure are provided in paras 7.133–7.227 of GSG-7 [10].		
109 GER-NUS 21 (1)	4.8	"4.8. An initial step in evaluating source intensities is to determine the fission rate, the neutron and gamma emission rate, and the spatial and energy distribution of the neutron and gamma flux within the core. This may be achieved by using computer codes in which account is taken of the spatial distribution of materials in the core	This paragraph neglects the radiation fields generated by gamma radiation. Most computer codes calculate neutron and gamma radiation fields in parallel as	Accepted			

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		and changes in fuel composition, the production of actinides and fission product poisons, and changes in control poisons (due to the positions of control rods, the heights of liquid moderators and poison concentrations) with fuel burnup. The neutron and gamma emission rate and neutron and gamma flux distributions that are calculated for the core are used as input data for computer calculations to determine the neutron and gamma flux energy and spatial distributions through the coolant and the structural and shielding materials surrounding the core. ~~The neutron and gamma flux distributions are used in computer codes (which may be coupled with the neutron flux calculations) or in hand calculations to determine production rates for gamma ray sources in the core and surrounding materials. Production rates are determined for both prompt emission and delayed emission (activation) sources. In the case of activation sources, the decay of nuclides (half-life) and the irradiation time in the neutron flux are taken into account in determining the intensity of gamma ray sources.~~	gamma radiation is unavoidable in a reactor core. Thus, the last three sentences can be deleted.				
110 SWEDEN 4	4.12 lines 7-9	Remove example "In PWRs, for example, the activation of 10 g of 59Co…"	The example could be interpreted as being applicable to all PWRs. It is far from. Therefore, it is not reasonable to include		*Para 4.12 will be modified as follows:* "…In some PWRs, for example, the activation of…"		The example focuses on SG with Ni bases alloy and illustrates that Co-60 and Co-58 are usually the main contributors to the dose rates. The example also

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			it in the general body of the safety guide.				provides a quantified relation between the metal release and the dose rates.
BELGIUM 2	4.12 / Line 9	Place the footnote (12) at the end of the page		Accepted			
111 GER-RAS 10 (3)	4.15. third line	…, the primary circuit pipework of light water reactors (LWR).	Please write out the abbreviation.	Accepted			
112 BELGIUM 3	4.17 & Several other lines	Sometimes isotopes are referred to with the nomenclature ^{XXX}ZZ, sometimes as ZZ-XXX and sometimes as NAME-XXX Other lines where this appears are 4.17, 6.13, I-53 and I-55	For consistency, the same nomenclature should be used systematically.	Accepted	*No correction was identified in para. 6.13.*		The international practice will be utilized (^{XXX}ZZ). Final verification of format will be done during Technical Editorial review. See resolution to comment 5bis (GER-RAS – 2).
113 GER-EPR 14	4.17	In many cases, the most important for external exposure one for tens of years after shutdown will be ^{60}Co and ^{137}Cs ~~-137~~.	Please use one single notation in the whole document.	Accepted			See resolution to comment 112 (BELGIUM-3).
114 USA-2 14	Para 4.17 Line 3	*Recommend revising third sentence to:* "…the most important radioisotopes for external exposure ~~one for tens~~ that will remain radioactive for dozens of years after shutdown will be…"	Improve readability	Accepted	*Para 4.17 will be modified as follows:* "In many cases, the most important radioisotopes for external exposure ~~one for tens~~ that will remain radioactive for dozens of years after shutdown …"		

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
115 SWEDEN 5	4.17 line 3-4	"… In many cases, the most important nuclides for external exposure during the first tens of years after shutdown…"	The present sentence is grammatically incorrect.				See resolution to comment 114 (USA-2 - 14).
116 USA-2 15	Para 4.17 Last line	Recommend revising the last sentence to: "For internal exposure, the most relevant radioisotopes include H-3 and Sr-90." Or: "Relevant isotopes for internal exposure include H-3 and Sr-90.	Improve readability	Accepted	*Last sentence of the para. will be modified as follows:* "For internal exposure, the most relevant ~~can be~~ radioisotopes include ^{3}H and ^{90}Sr.		
117 USA-3 9	4.18	Add two new sentences at the beginning of Section 4.18 stating, "Where appropriate, concrete inside of radiologically controlled areas should be sealed during plant operation to facilitate cleaning and decontamination. Consideration may also be given to sealing concrete to prevent the release of radon gas." The next sentence (original first sentence) should be revised to state, "During decommissioning the magnitude of the source term in concrete can affect both the doses to workers and the volume of radioactive waste that is generated."	Unsealed concrete produces radon gas, which can be a nuisance when trying to leave a radiological controlled area. In addition, the surfaces of concrete in radiologically controlled areas that may be contaminated should be sealed to facilitate cleaning and decontamination.	Accepted	*Para 4.18 will be modified as follows:* "4.18. ~~In the case of concrete~~ During decommissioning the magnitude of the source term in concrete can affect both the doses to workers and the volume of radioactive waste that is generated. Where appropriate, concrete inside of radiologically controlled areas should be sealed during plant operation to facilitate cleaning and decontamination. Consideration may also be given to sealing concrete to prevent the release of radon gas. The source term in this case may be dominated by radionuclides that are not very important during operation,		

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					such as the rare earth isotopes, and control of such impurities may be an important aspect of the design process."		
118 USA-13	4.18	The source term in this case may be dominated by radionuclides that are not very important during operation, such as the rare earth isotopes, and control of such impurities may be an important aspect of the design process, such as unsealed concrete.	Unsealed concrete produces radon gas, which can be a nuisance when trying to leave a radiological controlled area.			Rejected	See resolution to comment 117 (USA-3 - 9). Not in the scope of the para. and it could add complexity to the sentence.
119 JAPAN RASSC 5	4.24	4.24. The guidance on the assessment of the dose to the public due to the discharges resulting from the normal operation and against potential exposures are given in GSG-10 [19C]. ~~Details of how to assess the radiation exposure of the public due to releases of radioactive substances to the environment are given in SR Series 21 [42] mentioned in the appendix (para. A.6)~~. The guidance on the control of discharges and the process for authorization for discharges related to the radiation exposure of the public are described in Section 5 and Annex 1 of GSG-9 [20].	Clarification. SR Series 21 "Optimization of Radiation Protection in the Control of Occupational Exposure" (2002) does not provide the details of how to assess the public exposure due to the releases as it concentrates on the application of the optimization principle in workplaces (see FOREWORD of SRS-21). GSG-10 (2018) is the appropriate document that provides such	Accepted			

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			details on public exposure (i.e., paras. 5.7-5.42 for normal operation, and paras. 5.43-5.75 for potential exposures of Section 5, GSG-10). Note that SR Series 21 (2002) provides examples of the tools for monetary value of the unit collective dose and the use of cost-benefit analysis in its Annex III as mentioned in para. A.6 of Appendix, rather than the assessment of public exposure due to the releases.				
SECTION 5							
120 GER-NUS 22 (1)	5.5	"5.5. Provision should be made for controlling accesses to and exit(s) from the controlled areas and for monitoring persons and equipment leaving the controlled areas. Exit doors should have an interlock with the contamination monitors to avoid uncontrolled exit of contaminated persons or equipment."	The design shall include means to control exit with an interlock to the radiation monitoring to prevent spread of radionuclides by contaminated persons or equipment. Usually, doors will only open if no	Accepted	*The para. 5.5 will be completed as follows:* "5.5. Provision should be made for controlling accesses to and exit(s) from the controlled areas and for monitoring persons and equipment leaving the controlled areas. Exit doors should have an interlock		It seems also convenient to address the case of emergency evacuation: the doors have to open in case of fire and other emergencies.

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			contamination was detected.		with the contamination monitors to avoid uncontrolled exit of contaminated persons or equipment. Means for disabling the interlock during the evacuation should be provided."		
121 ONR UK 5	Add text after paragraph 5.17	"Areas that can contain in-core instrumentation would benefit from some form of interlock control which disables access when the probes are not in core or in storage."	Proposal for additional text in relation to PWRs. Suggest adding after paragraph 5.17 or other suitable place. The room beneath the core and the in-core instrumentation room (ICI), which is around 5 meters above this and around 5 to 10 meters off the center of the core are both areas where lethal dose rates can be received in a relatively short time even at shutdown. The probes which go into the core for various	Accepted	*The para. 5.17 will be completed adding, at the end, the following text:* "… Interlock controls that disable access should be considered for areas where dose rates can be temporarily high such as in core instrumentation areas"		A more general wording is used to take into account areas where temporary high dose rates are encountered

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			measurements are routed in and out from under the core and into the ICI room. In the ICI room the probes can be contained within shielded containers to allow access as doserates are low. Under the core provided there are no probes present doserates are low. This creates a case for potential over exposure, areas with low doserates when accessible but potentially lethal at other times.				
122 UKRAINE 2	5.19 (3)	Methods for sampling radioactive liquids with minimal exposure should be provided, *automated methods should be used where possible;*	to minimize radiation exposure	Accepted	*Item (3) from para. 5.19 will be completed as follows:* "(3) Methods for sampling radioactive liquids with minimal exposure should be provided. Automated methods should be used where reasonably achievable;		

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123 FRANCE 2	5.19	Add the sentence: "Materials containing sealed radioactive sources (such as radioactivity measuring devices) should preferably not be implanted in places where workers are passing through."	This measure contributes to dose optimization	Accepted	*The para. 5.19 will be completed adding, at the end, the following text:* "… To avoid worker's external exposure, materials containing sealed radioactive sources (e.g.: radioactivity measuring devices) that may present a hazard, should preferably be stored in dedicated rooms or areas and not in places where workers are passing through."		Radioactivity measuring devices can sometimes incorporate very small 'stay alive' sources.
124 ONR UK 6	Add text after paragraph 5.32	"The primary pumps of many designs require routine maintenance of the seals can have a significant contribution to worker dose. The seals are also a Loss of Coolant (LOCA) release pathway. Some designs have moved to canned pumps which do not need seals."	Proposal for additional text in relation to PWRs. Suggest adding after paragraph 5.32 or other suitable place.	Accepted	*A new para 5.32A will be added, after para. 5.32:* "5.32A. Consideration should be given to the use of seal-less canned reactor coolant pumps to reduce doses due to the maintenance of the seals and to the incidence of losses of coolant resulting from seal failures."		
125 USA (to NSGC) 4	Page 47, para 5.33	This paragraph discusses communication infrastructure and could benefit from referencing IAEA NSS No. 17 "Computer Security at Nuclear Facilities Technical Guidance Reference Manual"		Accepted	*The para. 5.13 will be completed adding, at the end, the following text:* " … in the specification for equipment specified (see IAEA NSS No. 17 'Computer Security at Nuclear Facilities Technical		

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					Guidance Reference Manual' [XX]).		
126 ONR UK 7	Add text after paragraph 5.34	"In many designs most of the filters and demineralisers are contained within a filter bank in concrete cells, and thus not accessed. Use of shielded transport to waste processing enables relatively high dose rates to accrue on the filters and thus minimizes radwaste and worker dose. This is important during such operations as inducing a crud burst prior to outage when many let down filters require processing. This also necessitates the need for two trains of such filters to allow continued clean up while the other filter is removed."	Proposal for additional text in relation to PWRs. Suggest adding after paragraph 5.34 or other suitable place.	Accepted	*A new para 5.34A will be added, after para. 5.34:* "5.34A. Consideration should be given to incorporating filters and demineralizers within concrete cells, and thus not accessible, together with shielded transport containers to enable relatively high dose rates to accrue on the filters, and thus to minimize radwaste and worker dose. Consideration should also be given to two trains of the coolant clean up filters, to allow continued clean up during oxygenation, while the other filter is removed."		More simple and general wording for a recommendation
127 EGYPT 10	5.36	It is proposed to add use of the television equipment when performing radiation-dangerous works in the controlled access area of NPP.				Rejected	The recommended additional text seems not necessary. Use of cameras (TV) is already included in this para.
128 GER-RAS 11 (2)	5.41. first sentence	Suggestion 1: …, starting with the design of shields without ~~penetration~~ feedthrough. Suggestion 2:	The use of the word "penetration" could lead to misinterpretation in the context of radiation protection.		*The para. 5.41 will be completed as follows:* "5.41. After the potential intensity … starting with the design of shields without		The term 'penetration' is the most common term for this in English, and the meaning should be clear from the context.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		…, starting with the design of shields without penetration, such as for pipes, cables and access ways.			penetrations (e. g. for pipes, cables and access ways). Next, consideration should be given … "		Neither 'penetration' nor 'feedthrough' are described in the IAEA Glossary, but the term is commonly used in the IAEA safety standards, e. g. in SSG-53 Design of Reactor Containment (2019). This para. corresponds to para. 4.55 in NS-G-1.13, where the term is also used.
129 GER-RAS 12 (3)	5.42. second line	… (whether beta and ~~breaking radiation~~ bremsstrahlung, neutrons and gamma rays only are produced) … (see 5.85 (e))	Uniform naming	Accepted			
130 ONR UK 8	Include text within paragraph 5.44	"Neutron transport calculations should be undertaken around containment. In some early designs, there is neutron shine through the ground level airlock of containment, outside the controlled area. This complicates site dosimetry arrangements."	Proposal for additional text in relation to PWRs. Suggest adding after paragraph 5.44 or other suitable place.	Accepted	*A new para 5.44A will be added, after para. 5.44:* "5.44A. Neutron transport calculations around containment should be undertaken to eliminate shine paths."		More simple and general wording.
131 GER-NUS 23 (1)	5.45	"5.45. A combination of materials may be necessary to obtain an optimum design of shielding for the core or for other sources of neutrons. ~~A material, such as iron or steel, with a high elastic or inelastic scattering cross-section should be used to reduce the energy of high energy neutrons.~~ A material, such as water or concrete, containing elements of low atomic number	In a nuclear power plant, neutrons energies are ranging from a few MeV to meV. To slow-down fast neutrons materials with high high hydrogen content (water,		*The para. 5.45 will be modified by deleting the second sentence, as follows:* "5.45. A combination of materials may be necessary to obtain an optimum design of shielding for the core or for other sources of neutrons. ~~A material, such as iron or~~		The need to use high atomic number material for gamma radiation shielding is covered in para. 5.47.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		reduces the energies of neutrons for which the cross-sections are below the cross-section threshold for nuclear inelastic scattering of the shielding material(s). A high atomic number material, such as iron steel or lead should be used to reduce gamma radiation due to slowing down and absorption of neutrons."	concrete, etc.) is necessary first. high atomic number materials are usually used in nuclear facilities with higher neutron energies, like accelerator facilities. As a second material a high atomic number material can be used to shield secondary gamma radiation from slowing down and absorption of neutrons.		~~steel, with a high elastic or inelastic scattering cross-section should be used to reduce the energy of high energy neutrons.~~ A material, such as water or concrete, containing elements of low atomic number reduces the energies of neutrons for which the cross-sections are below the cross-section threshold for nuclear inelastic scattering of the shielding material(s)."		
132 SWEDEN 6	5.45 last sentence	Considering rewriting the last sentence of the paragraph.	The content of the sentence is scientifically correct, however, the wording it is also far too scientifical for the target audience.			Rejected	The target audience includes nuclear reactor design teams. See resolution to comment 131 (GER-NUS 23).
133 GER-NUS 24 (1)	5.48	"5.48. In relation to the formation of voids during construction, consideration should be given in the design to ~~the application of an appropriate management system programme~~ facilitate the construction of the shielding in such a way that voids or low density areas will be avoided.	A management system program does not help to avoid formation of voids or low-density zones in the shielding. Is much more a design issue facilitating the erection of the shielding.		*The para. 5.48 will be modified as follows:* "5.48. In relation to the formation of voids during construction, consideration should be given in the design to the application of an appropriate management system programme to facilitate the construction of the shielding in such a way		It is suggested to keep the wording about an appropriate management system programme. This para. corresponds to para. 4.62 of NS-G-1-13; the only change incorporated is the replacement of 'quality assurance' by 'management system' (having wider scope than QA).

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
					that voids or low-density areas will be avoided.		
134 SWEDEN 7	5.48	Consider removing the paragraph	As of now, the paragraph is in lack of a specification of for what reason an appropriate management system should be implemented.		*See resolution to comment 133 (GER-NUS 24)*		
135 GER-NUS 25 (2)	5.51	"5.51. Where reactor coolant is used for shielding purposes (e. g. sufficient water coverage of spent fuel in spent fuel pools), or assumptions made about the shielding effect of the reactor coolant on occupational exposure, automatic sensors and controls should exist for ensuring that levels of the liquid stay within permitted ranges."	In particular the water coverage of spent fuel in spent fuel storage pools are a typical application.	Accepted			
136 GER-NUS 26 (1)	5.52	"5.52. The provision for shielding that is incorporated into the design to protect site personnel during plant operation from direct or scattered radiation should also be designed to ensure adequate protection of the public during plant operation. ~~In this respect it may be necessary to consider 'sky shine', particularly if buildings have roofs of light construction, and to restrict public access to the site by providing barriers such as fences.~~ The design should consider adequate shielding to prevent 'sky shine' as well as 'ground shine'."	Insufficient shielding of roofs was the main reason for sky shine effects. Today, plants should be designed with adequate shielding to avoid sky shine. Protection against external hazards (e.g. air plane crashes) will be a synergetic design issue.	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			In addition to 'sky shine' also 'ground shine' (e.g. activation of ground water, soil, etc.) should be prevented.				
137 JAPAN (NUSSC) 6	5.55	"5.55. In some cases, depending on the intensity and location of the source with respect to the penetration, no additional shielding features may be necessary. In other cases, plugs or labyrinths of complex design should be incorporated and computer based shielding calculations ~~should~~ may be made to justify the design. Labyrinth structures should be used to avoid duct streaming, noting that streaming may occur when shielding materials are used in combination, for example streaming of gamma radiation through low atomic number materials."	There are two shielding calculation methods for penetrations or labyrinth structures. One is a simple model with conservative assumptions. The other is a computer based calculation for complicated geometry and severe case. The first one should be taken account into.	Accepted			
138 ONR UK 9	5.57	Remove reference to TECDOC.	Paragraph 5.57 references a TECDOC (in sentence saying what should be done). SPESS C on drafting safety standards states "*In general, Safety Requirements and Nuclear Security*	Accepted			

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			Series Recommendations should not normally cite publications in a lower category, Safety Reports or TECDOCs. Safety Guides and Implementing Guides should not reference TECDOCs or other publications that present material of a tentative nature or in a provisional or preliminary form"				
139 EGYPT 11	5.58	Ventilation system should be to control and monitor the contamination of the working environment and to maintain directional flow from the point of least contamination potential to the point of greatest contamination potential which lead to reduce the need to wear respiratory protection.	Addition (in red) for more clarification			Rejected	Regarding the recommendation, no changes seem necessary in this para/section. Monitoring is covered in Section 8 and directional flow in para. 5.66.
140 UKRAINE 3	5.60 Line 2	"… To ensure that efficiency remains above the design limit, methods for assessing the efficiency should be provided.	It is not always sufficient to take air samples before and after filters (for example, at low air concentration in front of the filters). Special methods should be	Accepted	*The para. 5.60 will be modified as follows:* "5.60. The efficiency of filter systems … design basis. To ensure that efficiency remains above the design limit, the design should allow for suitable periodic tests and		

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			provided for assessing the filtration efficiency at the site of installation of aerosol filters and iodine adsorbers.		/or ongoing measurements such as sampling the air from upstream and downstream of the filter system ~~should be sampled and measured~~. Pressure differentials on filter systems should be monitored as well."		
141 USA-2 16	Para 5.63, line 2	For "CO2," the "2" should be a subscript	Editorial	Accepted			
142 EGYPT 12	5.66	It is proposed to add The pressure of rooms located in controlled areas should be maintained below atmospheric pressure to prevent the dispersion of radioactive substances into the atmosphere in normal operating conditions This could be achieved by ensuring that the flow rate of intake air is less than the flow rate of exhaust air, also airflow from rooms with a lower contamination risk towards rooms with higher contamination risk should be maintained, as far as practicable, in accident conditions.	Addition (in red) for more clarification	Accept	*The para. 5.66 will be completed as follows:* "5.66. The airflow in the ventilation … the resuspension of contamination. The pressure of rooms located in controlled areas should be maintained below atmospheric pressure to prevent the dispersion of radioactive substances into the atmosphere in operational states."		The subsequent suggestions deal with details of achieving airflow, which is out of scope; in addition, design features for operation in accident conditions is covered in Section 6.
143 FRANCE 3	5.68	Add the sentence: "Both routine and non-routine decontamination should be considered. The processes allowing dose optimization of workers (use of robotic, etc) should be the preferred option."	In addition to routine decontamination completed during outages (main component decontamination, pool	Accepted	*The para. 5.68 will be completed as follows:* "5.68. The need for decontamination … facilities should be made. Both		The suggested idea is formulated using a more general wording.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			decontamination,…), non-routine decontamination operations should be considered at the design stage. The optimization of doses related to decontamination operations should be considered at the design stage, as these operations can lead to significant individual and collective doses.		routine and non-routine decontamination should be considered. Decontamination processes should be optimized using automation (e. g. use of robotic) where this is reasonably achievable[x].” Footnote ‘x’: Related insights are provided in IAEA TECDOC 1946, Decontamination Approaches During Outage in Nuclear Power Plants - Experiences and Lessons Learned [XX].		
144 FRANCE 4	5.68	Add a reference to AIEA-TECDOC-1946: decontamination approaches during outages in NPP – experiences and lessons learned		Accepted	*See above resolution to comment 144 (FRANCE-3)*		
145 JAPAN (NUSSC) 7	5.74	“5.74. The coatings and/or the lining of fuel storage pool and fuel handling pools, as well as the equipment used in these areas, will become contaminated. When the water level in such pools is lowered, surfaces may dry out, and ~~this~~ the dispersal of material on the surfaces into the air may cause a hazard due to airborne radioactive material. Systems should be provided for decontaminating such surfaces before they dry out. Systems should also be provided	There are PWRs that the walls of SF pool are covered with a stainless steel lining. It is clarified that the dispersal of radioactive materials adhering to the pool wall surface into the air is a hazard source.	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		for decontaminating, before they dry out, fuel transport flasks and components that may have to be removed from the pools for repair."					
146 EGYPT 13	5.80	It is proposed to add Before explaining how to the design should be such as to minimize the deposition of resins…… shall give brief about how design features and operational procedures for waste generation and control shall include such as use of effective and reliable techniques and equipment, adequate zoning to prevent the spread of contamination ……	Addition (in red) for more clarification			Rejected	It seems preferable not to add the suggested idea/text. It falls out of scope of this SG, which focuses radiation protection aspects of design. Waste minimization is covered in other SGs.
147 EGYPT 14	5.84	The design of storage facilities for spent fuel and radioactive waste should incorporate the following functions: - Measures to prevent, detect and control fires - Filtration systems to control the release of airborne effluents, within regulatory limits.	It is proposed to add these points for more clarification			Rejected	Fire prevention, detection and control is out of scope of this SG. Effluents are covered in para. 5.98 onwards.
148 GER-NUS 27 (1)	5.92	"5.92. To protect the public from radiological consequences due to the operation of the plant, plant operators are required to ensure that doses to members of the public arising from radioactive substances in the effluents and from direct radiation due to the plant do not exceed the prescribed limits, and that the optimization principle is applied (GSG-8 [21] and GSG-9 [20]). This is requested by the Requirement 30 (Responsibilities of	Discharges are not regulated to optimise costs, but to protect the public against harmful effects of ionizing radiation. Regulatory limits must not be exceeded, and the design should apply the ALARA principle for dose	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		relevant parties specific to public exposure), Requirement 31 (Radioactive waste and discharges) and Requirement 32 (Monitoring and reporting), of GSR Part 3 [2]. ~~In practice, radioactive discharges are generally regulated so that the best practicable means that do not involve excessive costs are employed for minimizing discharges.~~ The design should be such that regulatory limits for discharges will not be exceed and as low as reasonably achievable. This is commonly done by specifying discharge limits for the most significant radionuclides, as described in para. 3.37 of this Safety Guide.	optimisation. For example, in Germany effective doses of max. 0.3 mSv per year are allowed for the public due to gaseous and liquid effluents, but the design has to result in lower values to the application of the ALARA principle.				
149 EGYPT 15	5.92	In this para, please format the writing and indicate the item number and reference only.		Accepted			*See resolution to comment 148 (GER-NUS 27).* Most of the wording of this para comes from para. 5.1 of NS-G-1.13 and current text appears to be consistent with other paras of the draft. However, editorial verification will take place during Technical Editorial review and also during final editing.
150 GER-NUS	5.98	"5.98. The flows and the activity concentrations of liquid and gaseous effluents need to be monitored and controlled to ensure that the regulatory ~~authorized~~ discharge limits are not exceeded (SSR-2/1 (Rev. 1) [1]). (…)"	Usually, authorized limits are defined in the licence and are plant specific as contributions from other nuclear and	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
28 (2)			radiation facilities in the vicinity have to be considered by the regulator to protect the public. During the design phase limits established in the legal or regulatory framework should be considered.				
151 JAPAN (NUSSC) 8	5.100.	"5.100. Proven methods of treating the radioactive waste water to reduce radioactive contamination use mechanical filtration, ion exchange, centrifuges, distillation or chemical precipitation. The different treatment processes in the liquid waste treatment system should be connected so as to give the operator sufficient flexibility to deal with liquids of different origins and unusual compositions, and to re-treat water if the authorized low activity for discharge is not attained after the initial treatment. In the case of direct cycle reactors such as BWRs, which generally produce larger volumes of radioactive water resulting from leakage from the turbine circuit, water that is of low chemical and solid content is recycled to the primary circuit after suitable treatment. The same recycling is a good practice for non-aerated primary coolant in PWRs but, in practice, the discharge of primary coolant may be necessary to control the levels of	To clarify that direct cycle reactor contains BWR. It is easier to understand that the tritium concentration control in the primary coolant and the necessity of secondary water treatment at the time of SG leak are presented as independent cases.	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		airborne tritium in the plant. In addition, rRadioactive water may be present in the secondary (turbine) circuit of a PWR as a result of operating with some primary circuit to secondary circuit leakage in the steam generator. In this case, treatment of the water from the secondary circuit may be necessary to reduce the activity before the water is discharged. N-16 monitoring equipment installed in the secondary coolant system is effective in detecting the leakage of cooling water from the primary system to the secondary system in PWRs.					
152 EGYPT 16	5.105	It is proposed to add Chemical forms in which the iodine may appear and of the influence that the physical and chemical behavior of the various forms have on the development of monitoring and removal system. Testing these filters using the most……	More clarification		*The para. 5.105 will be completed as follows:* "5.105. The isotopes of iodine, … over the lifetime of the plant. Special attention should be paid to the behavior of iodine due to its different physical and chemical forms. Detailed information is provided in Annex-I (e. g. see paras I-121 and I-122).		
153 GER-NUS 29 (1)	5.107	"5.107. All radioactive gaseous effluents discharged to the atmosphere should be released from elevated points, with the topography of the site taken into account. The level of elevation required should be justified in the optimization process, with consideration given to accident conditions.	Discharges should be monitored to measure the released activity of certain radionuclides. The measurement applied depends on the		*The para. 5.107 will be modified as follows:* "5.107. All radioactive gaseous effluents discharged to the … accident conditions. (See DS529, revision of NS-		The term 'amount' seems not necessary.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		(See DS529, revision of NS-G-3.2 [19]). Different measurements should be provided to monitor the amount of selected radionuclides released via stack (see paras 8.28 – 8.32).	radionuclides to be monitored and balanced.		G-3.2 [19]). Different measurements should be provided to monitor the selected radionuclides released via stack (see paras 8.28 – 8.32).		
154 FRANCE 5	5.110	Add the following subparagraph: "dosimeters adapted to the type of radiation and tele dosimeter systems "		Accepted	*The list of items/equipment of para. 5.110 will be completed by adding the following:* (13) Dosimetry for monitoring individuals' external exposure; (14) Personal radiation dosimeters; (15) Dosimeters adapted to the type of radiation and tele dosimeter systems;		
155 ONR UK 10	Paragraph 5.110.	Add "dosimetry for monitoring individuals' external exposure"	Equipment for monitoring intakes is included in this list but not for external radiation.	Accepted	*See resolution to comment 154 (FRANCE - 5).*		
156 USA-2 17	Para 5.110	Consider adding personal radiation dosimeters to the list	Completeness	Accepted	*See resolution to comment 154 (FRANCE - 5).*		

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
SECTION 6							
157 GER-EPR 15	6.1 (a)	"(a) The effects of events potentially happening in nuclear installations located in the area surrounding the ~~assessed~~ site assessed and having radiological consequences on it (See also NS-G-1.5 [15]);"	editorial	Accepted			
158 GER-EPR 16	6.2 Last line	"6.2. The design characteristics … and with paras 5.25, 5.41 and 5.42 of GSR Part 7 [9] (see para 2.20 of this ~~publication~~ Safety Guide)."	To be commensurate with the wording in this document	Accepted			
159 GER-EPR 17	6.5 Line 2	"6.5. Safe routes to places … Access to the necessary rooms of the nuclear power plant (including those accommodating relevant systems) and other arrangements (e. g. zoning, shielding, ventilation and sheltering)	editorial	Accepted			
160 JAPAN EPReSC 3	6.7 Line 3	"… However, it is acceptable to assume that the radiological acceptance criteria established for humans are conservative with regard to the protection of other species and that, from the radiological point of view, the protection of non-human biota is implicitly achieved by protecting the human population." *This sentence should be replaced by such expression in GSR Part 3 that* "the system of protection and safety, which aims to assess, manage and control exposure to radiation for humans, generally provides	For the sake of clarification and accuracy		*See resolution to comment 163 (ENISS 2).* *A new title will be included above para. 3.29 and the new para. 3.28A:* "*Design for radiation protection for the environment"* *Second sentence of para. 6.7 (now 3.28A) will be modified as follows:*		It seems better not to quote the item 1.33 as it covers just one portion of GSR Part 3, and that sentence is followed by: "Nevertheless, international trends in this field show an increasing awareness of the vulnerability of the environment. Trends also indicate the need to be able to demonstrate (rather than to assume) that the environment is being

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		for appropriate protection of the environment from harmful effects of ionizing radiation".			"3.28A ~~6.7.~~ The maximum radionuclide ... pathways for non-human biota. ~~However, it is acceptable to assume that t~~The radiological acceptance criteria established for humans are generally conservative with regard to the protection of other species and that, from the radiological point of view, the protection of non-human biota is ~~implicitly~~ generally achieved by protecting the human population (see para. 1.33. of GSR Part 3). Further recommendations on the protection of non-human biota are provided in GSG-8 [21], GSG-9 [20] and GSG-10 [19C]."		protected against effects of industrial pollutants, including radionuclides, in a wider range of environmental situations, irrespective of any human connection. This is usually accomplished by means of a prospective environmental assessment to identify impacts on the environment, to define the appropriate criteria for protection of the environment, to assess the impacts and to compare the expected results of the available options for protection. Methods and criteria for such assessments are being developed and will continue to evolve."
161 JAPAN RASSC 5 bis	6.7 (Page 62)	"6.7. The maximum radionuclide concentrations that may be present in relevant local flora and local and migratory fauna, as well as the internal dose that may result from those concentrations, should be assessed through considerations of the exposure pathways for non-human biota. However, it is acceptable to assume that the radiological acceptance criteria established	Clarification	Accepted	*See resolution to comment 160 (JAPAN – EPReSC3).*		It seems better to use the term 'recommendations', instead of guides.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		for humans are conservative with regard to the protection of other species and that, From the radiological point of view, the protection of non-human biota is implicitly achieved by protecting the human population. Further guides on the consideration of the protection of flora and fauna are provided in GSG-8 [21], GSG-9 [20], and GSG-10 [19C]."					
162 ENISS 2	6.7	"6.7. The maximum radionuclide concentrations that may be present in relevant local flora and local and migratory fauna, as well as the internal dose that may result from those concentrations, should be assessed through considerations of the exposure pathways for non-human biota. However, it is acceptable to assume that the radiological acceptance criteria established for humans are conservative with regard to the protection of other species and that, from the radiological point of view, the protection of non-human biota is implicitly achieved by protecting the human population."	This statement is in accordance with ICRP 60 and absolutely true. Consider to put the statement to the front of the document.	Accepted	*The para. 6.7 will be placed as 3.28A, under a new title* 'Design for radiation protection for the environment' *See resolution to comment 160 (JAPAN – EPReSC3).*		
163 USA-3 1	6.7	*Section 6.7 states:* "6.7. The maximum radionuclide concentrations that may be present in relevant local flora and local and migratory fauna, as well as the internal dose that may result from those concentrations, should be assessed through considerations of the exposure pathways for non-human biota. However, it is acceptable to assume that the radiological	Consistency between IAEA standards and NRC positions and regulatory practices.	Noted	*See resolution to comment 160 (JAPAN – EPReSC3).*		No changes to the para are suggested in the comment.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		acceptance criteria established for humans are conservative with regard to the protection of other species and that, from the radiological point of view, the protection of non-human biota is implicitly achieved by protecting the human population." *This position is consistent with the way NRC conducts environmental reviews; however, Section 6 is on accident conditions. The NRC does not specifically evaluate the radiological impacts to non-human biota during accidents. The NRC focuses on the impacts to humans during accidents.* Consideration should be given to moving Section 6.7 to Section 5 or elsewhere in the document.					
164 USA-3 2	6.8 and 6.9	*These sections focus on the design ensuring protection of site personnel during accidents (Section 6.8 discusses protecting site personnel from all accidents, includes severe accidents and Section 6.9 specifies that the design should be such that "all" site personnel should be protected during accidents).* *This appears inconsistent with NRC requirements and practice in which we evaluate that the design is adequate to protect control room operators, mission*	Consistency between IAEA standards and NRC positions and regulatory practices.		*The para. 6.9 will be modified as follows:* 6.9. The design should be such that the operating organization can ensure the safety of all persons involved in emergency response on the site in the event of radiological emergency, in compliance with …".		The change is intended also to cover people in shelters, making the statement less strict, but still sufficiently general.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		dose for persons performing missions required to take emergency actions (to protect the plant and the public), and the public. However, we don't review the design or perform an assessment to ensure that all persons in the plant are radiologically protected during design basis accidents or severe accidents, unless something similar to this is done in EP space (which I am unaware of). Consider revising to specify that the design is such to meet control room dose, mission dose, and the dose to the public (instead of all persons on site).					
165 BELGIUM 4	6.13 Lines 5-12	These arrangements should include: - Arrangements....workers; - Procedures ...(GSR Part 7 [9]); - Arrangements ...conditions; Arrangements...event.	Place items as a list and not as continous text	Accepted	*The format of para. 6.9 will be modified as follows:* "… These arrangements should include: — arrangements to assess … workers; — procedures to ensure that … Part 7 [9]); — arrangements for the provision … conditions; — arrangements for the provision … event.		
166 EGYPT 17	6.13	- appropriate specialized protective equipment which depends on the severity of the hazard - (e.g. ~~**mask filters**~~ Respiratory protection		Accepted	*Second and third items of para. 6.13 (see in resolution to comment 165 (Belgium 4)) will be modified as follows:*		

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
					— arrangements for the provision of appropriate specialized protective equipment (which depends on the severity of the hazard), procedures and training for …postulated hazardous conditions; — arrangements for the provision and secure storage of sufficient amount of consumables (e.g. respiratory protection ~~mask filters~~ and pollution protective clothing) that ...”		
167 GER-RAS 13 (3)	6.14. Footnote 12 second line	… gas circulators in gas cooled reactors (GCR), …	Please write out the abbreviation.	Accepted	*Footnote 12 (now 15) will be modified as follows:* [15] “… releases (e.g. pumps in water cooled reactors or gas circulators in gas cooled reactors ~~GCRs~~, which are required to maintain …”		
168 USA-3 3	6.18	*Section 6.18 (section 6 is on accidents) states, consideration should be given to the provision of safe locations for monitoring vehicles equipped with air dose rate measurement, air concentration measurement, radionuclide analysis, GPS and adequate filtration.* *I’m unaware of any NRC guidance related to this, unless something exists in EP*	Consistency between IAEA standards and NRC positions and regulatory practices.	Noted			The comment is only provided for information.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		space (I didn't get a chance to discuss with EP). *It says this is a consideration and not something that is necessary, so it may be ok to ignore this comment. I'm only flagging this because I'm not aware of anything like this in NRC space.*					
169 USA-3 4	6.19	*Section 6.19 discusses alerting and assembling and, at least provisionally sheltering site personnel during an accident. This reads as if non-essential, non-emergency response personnel may be sheltered in place at the site.* *Typically, essential personnel are in the control room, onsite support centers, and technical support centers. And non-essential personnel would be sent offsite. NRC does not evaluate doses for assembly areas or evacuation of non-essential personnel, although there may be numerous suitable places inside the facility for short term sheltering.*	Consistency between IAEA standards and NRC positions and regulatory practices.		*The para. 6.19 will be modified as follows:* "6.19 Provisions should be made …site personnel not involved in emergency response until its evacuation. Multi-system…"		There should be some responsibility for protecting all personnel.
170 GER-NUS 30 (1)	6.23	"6.23. Provisions for shielding should be incorporated into the design to protect the public under accident conditions from direct or scattered radiation. ~~In this respect it may be necessary to consider 'sky shine', particularly if buildings have roofs of light construction, and to restrict public access to the site by providing barriers such as fences.~~ In addition, site boundary monitors should be properly placed to	Today, the design shall be such that sky-shine will not be an issue.		*The para. 6.23 will be modified as follows:* "6.23 Provisions for shielding should be incorporated … accident conditions from direct or scattered radiation (including sky-shine). ~~In this respect it may be necessary to consider 'sky shine',~~		It seems appropriate to include general wording.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		allow for the monitoring of the spread of radioactive plumes, based on topographical and meteorological data (see paras 8.33 – 8.36).			~~particularly if buildings have roofs of light construction, and to restrict public access to the site by providing barriers such as fences.~~ In addition, site boundary monitors … "		
171 GER-EPR 18	6.26 Line 3 and Line 10	" … It is the usual design practice to assume that an unfavourable meteorological situation prevails during and after the accident (see the recommendations provided in paras of NS-G-3.2 [19]). … the methodology should include the preparation of a list of radionuclides making a major contribution to the doses. International guidance exists for the definition of a representative person (see IAEA Safety Glossary [13]).	editorial	Accepted			
172 BELGIUM 5	6.26 / Line 12	(see IAEA Safety Glossary [13]).	")" is missing	Accepted	*See resolution to comment 171 (GER-EPR 18).*		
173 GER-RAS 14 (3)	6.26.	… the definition of a representative person (see IAEA Safety Glossary [13]).	Editorial	Accepted	*See resolution to comment 171 (GER-EPR 18).*		
174	6.28	It should be deleted or rewritten.	This paragraph only describes the arrangements for emergency		*The para. 6.28 will be modified as follows:*		Link to the design

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
JAPAN EPReSC 4			preparedness and response, which are the provisions included in GSR Part 7. It should either be deleted or the necessary guidance should be provided from a design perspective.		"6.28. Within the off-site areas where protective actions are planned in the event of a severe emergency (e.g. the precautionary action zone[14] and the urgent protective action planning zone[15]), arrangements (such as ~~radioactive release measurement one~~s radiation monitoring equipment or ~~weather~~ meteorological station) should be made for promptly assessing any radioactive contamination, releases of radioactive material and doses for the purpose of determining or modifying urgent protective actions following a release of radioactive material (see the international safety requirements for emergency response in GSR Part 7 [9] and the requirements 44, 45 and Schedule IV of GSR Part 3 [2]). Footnote[14] Precautionary action zone (PAZ): See 'emergency planning zone' at the IAEA Safety Glossary [13].		

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
					Footote[15] Urgent protective action planning zone (UPZ). See 'emergency planning zone' at the IAEA Safety Glossary [13].		
175 Internal	(6.30 (4)) Footnote 16	[16] For boiling water reactors, … a significant amount of volatile radioactive substances may be released by ~~suppressed from~~ the water contained in the suppression chamber.	Editorial.	Accepted			
176 GER-NUS 31 (1)	6.30 (6)	"(6) Providing shielding in places where radioactive material released to the containment or to a building would otherwise cause radiation exposure above the limits set for the accident analysis owing to direct or scattered radiation (including sky shine and ground shine);	Ground shine should also be considered.	Accepted			
177 SWEDEN 8	6.32 line 5	… may be considered in safety demonstration of design if approved in national regulations.	It is far from obvious that national regulations approve of the inclusion of emergency countermeasures in the safety demonstration.		*The para. 6.32 will be modified from line 3 as follows:* "… Use of emergency countermeasures (e.g. sheltering, iodine prophylaxis and relocation of people) ~~with corresponding dose reduction factors~~ may be considered in safety demonstration of design. Such consideration should be limited in area and time, and in accordance with national regulations. ~~Such~~		The modification is intended to be consistent with SSR-2/1 (Rev. 1).

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
					~~consideration of dose reduction factors can be made~~ Dose reduction factors can be applied provided that clear instructions in emergency plans are available …"		
SECTION 7							
178 EGYPT 18	7.21	The following measures for reducing radiation exposure during decommissioning: - Waste management concept, especially concerning treatment of radioactive material towards clearance or disposal, and options for logistics; -Water supply and drainage systems;	It is proposed to add these points for, more clarification	Accepted			
179 GER-EPR 19	7.29 (1)	Protective clothing~~,~~(e.g. boots~~, etc.~~);	Clothing includes boots	Accepted			
180 JAPAN WASSC 1	7.30 Line 3	"… It is likely that there will be improvements in remote control techniques over the lifetime of the plant and between **initial stage and later stages** ~~stages 1 and 3~~ of decommissioning.	Stage 1, 2 and 3 of decommissioning' are not defined in GSR Part 6.	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
181 EGYPT 19	7.30	It should be ensured in the design Which effectively performing required tasks is beneficial in reducing both exposure and cost Remote equipment that was only powerful enough to break point welds carried out remotely or using robotic equipment	Addition (in red) for more clarification			Rejected	These aspects are already covered by other paras related to Optimization.
182 GER-RAS 15 (3)	7.42. last line	… airborne radionuclides (see para 8.21 of SSG-47 [43]).	Editorial	Accepted			
183 GER-RAS 16 (3)	7.53. (d)	Allowing the retrieval of the waste for transport off the site;	Editorial	Accepted			
184 JAPAN (NUSSC) 9	7.66	"7.66. Proven methods of treating the radioactive waste water to reduce radioactive contamination use mechanical filtration, ion exchange, centrifuges, distillation or chemical precipitation. The different treatment processes in the liquid waste treatment system should be connected so as to give the operator sufficient flexibility to deal with liquids of different origins and unusual compositions, and to re-treat water if the authorized low activity for discharge is not attained after the initial treatment. In the case of PWR, rRadioactive water may be present in the secondary (turbine) circuit	Insert "in the case of PWR" at the beginning of the 3rd sentence to clarify that the necessity of secondary water treatment at the time of SG leak is one case.	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		~~of a PWR~~ as a result of operating with some primary circuit to secondary circuit leakage in the steam generator. In this case, treatment of the water from the secondary circuit may be necessary to reduce the activity before the water is discharged during decommissioning.					
SECTION 8							
185 EGYPT 20	8.2 Item (iii)	This item [(iii) Background radioactivity in the environment] is proposed to be replaced by (Airborne contamination can be present as particulates, gases, vapours radionuclides, tritium)	More clarification			Rejected	Details about environmental monitoring can be found in paras 8.33 – 8.37. It seems preferable to keep the existing wording.
186 BELGIUM 6	8.14 / Line 3	Power sources (SSR-2/1 (Rev. 1) [1], para 6.44D).	"." Is missing at the end	Accepted			
187 ONR UK 11	Add text after paragraph 8.27	"The presence of hot particles needs to be considered in the radiation protection programme. Early generation alpha/beta body monitors are not capable of detecting with sufficient efficiency discrete particles which can deliver high localised skin doses."	Proposal for additional text in relation to PWRs. Suggest adding after paragraph 8.27 or other suitable place.			Rejected	It seems not necessary to supplement the text, since in general the idea is included in para. 8.26 (surface contamination is included in the first sentence of para 8.26; the third sentence says: "Contributions of alpha, beta, gamma and neutron radiation should be taken into consideration.") and GSG-7 is there referred for details.
188	8.27 / Line 2	Exits... GSR Part3 [2]):	":" is missing before listed items	Accepted			

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
BELGIUM 7							
189 GER-RAS 17 (3)	8.39. third line	… and main streamlines of boiling water reactors (BWR).	Please write out the abbreviation.	Accepted			This and other abbreviations will be written in full during the different steps of edition. Some as PWR, BWR, PHWR or GCR have been already extended.
190 GER-NUS 32 (2)	8.54	"8.54. Following an accident, there should be a means of taking representative samples from both the gas and the water within the reactor containment for laboratory measurements. The sampling equipment should be designed to withstand not only design basis accident conditions but also design extension conditions ~~that would arise following severe accidents~~. The laboratory should have arrangements for the safe handling and analysis of such 'hot' samples.	Accident conditions comprise DBA and DEC with and without core melt. To be inline with the plant states defined in SSR 2/1 and the IAEA Glossary the term 'design extension conditions' should be used including	Accepted			
Appendix							
191 ENISS 3	A2	Optimization techniques should only be applied below any limits or constraints established by the government or regulatory body on risk or dose that they consider to be tolerable for a new nuclear power plant. Optimization arguments should not be used to justify levels of risk or dose above any limits or constraints set	The constraints are tools related to the source while doe limits are individual oriented. Please clarify how these concepts interact in case of optimisation .			Rejected	The text is in line with the IAEA safety glossary and in this specific case no clarification is needed.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
ANNEX I							
192 SWEDEN 9	Annex I	Consider removing Annex I	The intention of the Annex is good. However, the present text contains several incorrect statements, generalisations and badly written paragraphs. The radiation sources and source terms during different plant statesis an important subject but should probably be treated within the frames of a technical report rather than a safety guide in order to give the reader a more detailed and nuanced picture.			Rejected	The content of annexes II, III and IV of NS-G-1.13 has been updated and included in a single annex in DS524 (Annex-I). This represents a major part of the text. Enhancement of the new text is expected, based on comments/ suggestions from reviewers (e. g. comments 194 - 198). Consideration of source term seems to be a fundamental part of RP in design, hence its inclusion in NS-G-1.13 and in current revision.
193 USA-3 5	Annex-I, Section I-7	Section I-7 discusses residual surface contamination of the cladding by uranium and that a limit for uranium surface contamination on the cladding to prevent fission products in the coolant. I'm unaware of any similar requirements or guidance for NRC. We could consider evaluating if this is necessary.	Consistency between IAEA standards and NRC positions and regulatory practices.	Noted			No changes suggested.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
194 USA-3 6	Annex-I, Section I-14	This section discusses that the cobalt content of stainless steel and nickel-based alloys in contact with reactor primary coolant and/or under neutron flux needs to be specified for the design and strictly controlled. This should specify that the cobalt content should be as low as possible to meet as low as is reasonable achievable plant doses and that the design practice of limiting cobalt content as much as possible should be limited throughout the life of the plant, including during replacement of components. Suggest revising this comment as follows: "The cobalt content of stainless steel and nickel-based alloys in contact with reactor primary coolant and/or under neutron fluid should be as low as is reasonably achievable to achieve occupational exposures as low as is reasonably achievable. The maximum values of cobalt content and stainless steel and nickel-based alloys in contact with reactor primary coolant and/or under neutron flux should be specified and strictly controlled."	Consistency between IAEA standards and NRC positions and regulatory practices and to make clear that the cobalt content should be as low as is reasonably achievable to meet ALARA requirements.	Accepted			
195 ONR UK 12	Add text after or as part of paragraph I-19	"The let-down water pipe needs to be sufficiently long to ensure decay of N-16 prior to the pipe exiting to the auxiliary building where operator access may be permitted during operation."	Proposal for additional text in relation to PWRs. Suggest adding after		*Para I-19 will be completed with text suggested, incorporated at the end of the para.*		The text is a logical continuation of the content of I-19.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			paragraph I-19 or other suitable place.				
196 BELGIUM 8	I-30 / Line 2	... low activity concentration should ~~is to~~ be avoided				Rejected	No 'should statements' in annexes.
197 ONR UK 13	Add text after paragraph I-55	"If the temperature reduction is not controlled correctly during shutdown when the primary circuit is drained down during outage, iodine "hideout" can become airborne and result in significant airborne contamination levels in containment. This is the case even with low levels of fuel failure."	Proposal for additional text in relation to PWRs. Suggest adding after paragraph I-55 or other suitable place.		*The para. I-55 will be modified/completed as follows:* "… moderator cover gas system. In PWRs, if the coolant temperature is not properly controlled its reduction can result in significant iodine plate-out on reactor coolant piping. Such iodine can be released as airborne contamination during shutdown, when the primary circuit is drained down. Iodine 'hideout' can become airborne and result in significant airborne contamination levels in the containment. This is the case even with low levels of fuel failure.		
198 ONR UK 14	Add text after paragraph I-55	"Boron/lithium free chemistry can significantly reduce the tritium source term."	Proposal for additional text in relation to PWRs. Suggest adding after paragraph I-55 or other suitable place.	Accepted	*The suggested text will be added at the end of para. I-20.*		It seems better to include the suggested text in para. I-20.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
199 BELGIUM 9	I-82 / Line 7	The significance of the release for this event is due to: (1) The high ...; (2) The break...; The dry-out...	Place items as a list and not as continous text	Accepted			
200 ONR UK 15	Add text after paragraph I-109	"There is a simplistic source term determination method for faults for LWRs given in NUREG-1228, which will be of use during faults and for benchmarking"	If the Annex is providing advice to consider using quite old NUREGs rather than more modern methods, there are others which could be of value to some readers. NUREG-1228 provides to some complementary information to that in NUREG-1465. Definitive advice on what to use should come from US NRC as it is their documentation.			Rejected	Current guidance the NRC provides in RG 1.183 for the evaluation of design basis accident source terms is based on NUREG-1465 (not in NUREG-1228). In addition, NRC is developing an update of RG 1.183, which will provide an updated source term methodology. During an actual accident, event specific information (including plant and accident specific information) should be considered in estimating the amount of core damage and the quantities of radioactive material released.
201 GER-RAS 18 (3)	Annex I-121.	… plate out on wet surfaces in its ionic form [I-13].	Reference is missing	Accepted			
202	Add text to Annex I or other	Add extra text if considered appropriate	Paragraph 1.11 states that this guide is primarily intended for water cooled reactors			Rejected	Aspects of the suggestion may fall out of the scope of the existing design safety requirements. In general, it

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
ONR UK 16	suitable place		however the stated scope in the DPP suggests over reactors will be considered. Specific points associated with Hight Temperature Gas Reactors (HTGR) could be added to Annex I. IAEA TECDOC 978 may provide the basis for some extra text on the need for dust generation in HTGR pebble designs and the impact on radiation protection to be considered. Cobalt-60 source terms need consideration and addressing. The extensive fuel sphere movement pipework of a pebble design requires shielding and access control. Proposal for additional text in				seems premature to specifically address HTGRs or other advanced reactor designs in the safety guide; for so doing, a comprehensive consideration by interested parties seems necessary.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			relation to HTGRs. Suggest adding to Annex I or other suitable place.				
202 UK / ONR 17	Add text to Annex I or other suitable place	Add extra text if considered appropriate	Paragraph 1.11 states that this guide is primarily intended for water cooled reactors however the stated scope in the DPP suggests over reactors will be considered. Specific points associated with lead reactors could be added to Annex I. Silver and antimony are difficult to remove from lead and thus can lead to potentially high doserates from their activation products. Fission gas bubbles will rise from failed or damaged fuel and provide a transport means for radioiodine to escape to the cover gas above a lead			Rejected	See resolution to comment 202 above. Same applies to the case of lead reactors.

COMMENTS BY REVIEWER				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			cooled pool type reactor.				
203 ENISS 3	A2	Optimization techniques should only be applied below any limits or constraints established by the government or regulatory body on risk or dose that they consider to be tolerable for a new nuclear power plant. Optimization arguments should not be used to justify levels of risk or dose above any limits or constraints set	The constraints are tools related to the source while doe limits are individual oriented. Please clarify how these concepts interact in case of optimisation.			Rejected	The text is in line with the IAEA safety glossary and in this specific case no clarification is needed.

NOTE:

- Relevance of comments from Germany (NUSSC; RASSC): (1) – Essentials; (2) – Clarification; (3) – Wording/Editorial